

THE BIOLOGIST

A Quarterly Journal Promoting Research
Interest in the Biological Sciences

CONTENTS

THE ORIGIN AND EVOLUTION OF THE HOUSEHOLD INSECTS	57
By Gerard Smith, S.J.	
PHILIP HENRY GOSSE—THE GREAT RECONCILER	67
By David Causey	
SCIENCE AND PHILOSOPHY	72
By Gerard Smith, S.J.	
SUGGESTIONS IN RESEARCH METHODOLOGY	80
By Gregorio T. Velasquez	
NEW BOOKS—Short Summaries	85
CAREERS FOR BIOLOGISTS	98-99
By Lester P. Coonen	
EDITORIALS—Milligan Retires—Philatelists, Attention!—Which Way the Curve?	104
PHI SIGMA AT LARGE—Foreword—Those Vacant Chairs—The Gentleman's Agreement—Contacts to be Made—How to Start a New Chapter	107
PROCEEDINGS OF THE ST. LOUIS MEETINGS—As Reported by Secretary Orcutt	114
AMONG OURSELVES—Personalities—In the Editor's Mail—Winners of the 1951-52 Phi Sigma Awards	123
THE CHAPTERS—Their Officers and Activities	129

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HARLEY JONES VAN CLEAVE

Born 5 October 1886

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SINCE JANUARY 1951

Died 2 January 1953

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THE ORIGIN AND EVOLUTION OF HOUSEHOLD INSECTS

By MELVILLE H. HATCH

The purpose of this essay is to show something of the long time processes involved in the matter of household insects. The problem is, in its broad entomological setting, ecological. Ecology is derived from the Greek word "oikos" meaning home, and is the branch of biology dealing with the home-life or habitat relationships of plants and animals.

Now an ecological problem has two facets to it, both of them of equal importance. On the one hand, there are the organisms themselves, in this instance the formidable array of insects and near-insects that constitute the special concern of the home owner and pest control operator. On the other hand, there is the particular set of environmental conditions provided by the household which the household insects find adapted to their way of life.

From the point of view of the student of geological history and evolution, insects are very old. The first known winged insect was a slow-flying dragonfly-like creature that lived back in the Pennsylvanian Period some 250 million years ago, at a time when vertebrate life had evolved no higher than the salamander. These

first flying insects go by the jaw-breaking name of Palaeodictyoptera or "ancient net-wing," and it was from it that all the hundreds of thousands of winged insects that have since appeared have descended.

A major evolutionary problem encountered by "ancient net-wing" was what to do with its wings when not in use. For "ancient net-wing"—Palaeodictyoptera—was like a dragonfly, with its wings sticking out directly from the sides of its body like an airplane. Nothing is more useful than wings when one wants to fly, nothing is more in the way when one wants to walk around on the ground. The descendants of Palaeodictyoptera solved this problem in a number of ways that are well known. In some instances, as in moths (Lepidoptera) and flies (Diptera) the wings are laid flat over the abdomen when not in use. In cockroaches (Orthoptera) and beetles (Coleoptera) only the hind wings are used in flight and when not in use, are folded up under the front wings which have become hardened wing-covers, and the insects slip into cracks and crevices with all the ease of a completely wingless species. Thus the cockroaches and beetles come to

combine the advantages of both a winged and wingless animal.

A third method of handling the wings when not in use is represented by the termites (Isoptera) and ants (one of the Hymenoptera). In these insects only the sexual stages are winged and even in them are used only during the dispersal and mating flight. After mating, the wings drop or are bitten off, and the insects are wingless for the rest of their lives, as are likewise the sterile worker and soldier members of the species.

A fourth type of modification is found in the blood-sucking parasites, the sucking-lice (Anisoptera) and bed bugs (one of the Hemiptera) and fleas (Siphonaptera). Here wings have been completely suppressed, for entomologists have every reason to believe that these insects originally came from winged ancestors. With such forms, the insect world has, as it were, run a full circuit, and is back in the same condition as those other blood-suckers, the mites and ticks (Acarina), which are not insects at all and never had any winged ancestors in their family-tree.

And so, for 250 million years the insects continued to evolve and became the most numerous and, in many ways, the most dominant and successful group of land animals. They pushed with energy and force into every possible type of environment, but as yet there were no household insects in the world, for the simple reason that there were as yet no humans to build houses!

* * *

The entomologist cannot resist, at this juncture, calling attention to the fact that, wherever situations remotely analogous to human houses have come into existence, various sorts of insects have invaded them and taken up life there. Thus the burrows of birds and mammals are frequently invaded by scavenging insects of divers types. More famous than these, however, is the complex series of species that have come to inhabit the nests of various social insects, especially the bees, termites, and ants. An entire book, for instance, is devoted to the insects in the nests of British ants, and it can be asserted without fear of contradic-

tion that the series of insects inhabiting the nests of termites and ants, especially in the tropics, are every bit as formidable as those invading human dwellings. There is, however, this difference between the insects inhabiting animal burrows and the nest of social insects and those in the human household. Many of the insects associated with animal and insect dwellings are peculiar species not found elsewhere. In fact, two or three entire families of beetles each including several hundred species are found nowhere else except in the nests of ants. The insect and animal dwellings have existed so long—probably on the order of several millions or tens of millions of years—that distinct species and groups of species have evolved in adaptation to the conditions present. This is strikingly different from the situation in man, where, for reasons that will be developed later, only the sucking lice and bed bug have developed peculiar species associated with him.

* * *

There will next be enumerated briefly the habitat relationships of the principal household insects.

First, there are the stragglers—insects normally living outdoors, that wander into the house without taking up residence there. The moth flitting around an electric light on a warm summer evening, the earwig, sowbugs (Oniscoidea) and springtails (Collembola) invading a damp basement, are examples of what is meant.

If sufficiently numerous, such insects cause real distress to the householder, like the midges (Chironomidae) that every few years swarm into the houses near Klamath Lake, Oregon, or the mites or non-human bed bugs that may come from pigeons or swallows nesting under the eaves of a house. Only one individual of the stinking ground beetle (*Nomius pygmaeus* Dej.) need gain entry to a home to make the inhabitants extremely unhappy. Moreover, certain of our Brachyrhinus weevils at times move into houses in numbers, without appearing to do any harm there, and two or three years back western Washington was subjected to veritable plague of two-spotted lady beetles (*Adalia bi-*

punctata L.) swarming into the living quarters of dwellings during the winter, apparently being awakened from hibernation by the heat of the house.

Second, among the general ecological classes of household insects are the scavengers. House flies, cockroaches, book lice (Corrodentia), spider beetles (Ptinidae), and house ants are the examples that first come to mind. They live on odd bits of organic matter that they find, and many of them have become highly specialized household pests.

Thirdly, there are the specialized scavengers that inhabit stored food. The grain and meal beetles, the meal moths, the bean and pea-weevils, the larder beetles, the drug-store and cigarette beetles, are some of the species that come under this heading.

Fourth, there is a second even more highly specialized type of scavenger that feeds on hair—the clothes moths and carpet beetles. One says "highly specialized" advisedly, because the keratin protein that they feed on cannot be digested by most insects.

Fifth, there are the wood borers—the carpenter ant, the termite, the furniture beetle, the powder post beetle, and others—that invade the wood portion of our houses or freshly manufactured wood products.

Sixth, there are the blood suckers: the lice, mites, bedbugs, fleas, and mosquitoes, that attack man's person, and sometimes transmit serious diseases.

Seventh, there are those species that are predators and parasitic on the other household insects. The curious and rather uncommon household pseudoscorpion, (*Chelifer cancrivorus* L.) with the appearance of a tiny tailless scorpion, is such a species, and in the more southern states, the long-legged house centipede, (*Scutigera forcipes* Rafinesque) that glides like a shadow over the wall in the night time. While, theoretically, such species are beneficial, man is likely to want to get rid of them along with the injurious species.

* * *

Man appeared on the earth some million years ago—a figure that is to be contrasted with the 250 million years of earth's occupancy by insects.

Up to about twelve thousand years back, in other words, for about 99% of his existence, man was a hunting-and-fishing animal living in small tribal groups without permanent habitations (except as he may have occasionally taken up life in caves) without or with only very slight communication with other groups. Of insect pests, he had inherited his two species of sucking lice from his ape-like ancestor, and had perhaps acquired his bed bugs during his cave-frequenting period from the bats and swallows that inhabit such places,—a phase of his life that passed some thirty or forty thousand years ago. Only the sucking lice and the bed bugs have been associated with man for a sufficiently long period to allow the relatively slow processes of evolution to produce distinct species.

It was not until about ten thousand years B.C., with the discovery of agriculture and animal husbandry, that man began to develop more or less fixed abodes and only about four thousand years B.C. that some of the fixed villages began to transform into the first cities. Recent as these dates are in comparison with the other figures we have been mentioning, they are very ancient indeed in comparison with the century or so of the science of entomology. Much as we would like to scrutinize the records of pest control operation in the first cities of Babylonia and Egypt and to have witnessed one by one the new pests as they first invaded the houses and granaries and spread out over the land, we are almost completely denied any such experience and are compelled to depend almost exclusively on circumstantial evidence in formulating our account of what seems to have occurred.

What evidence there is, however, confirms the great antiquity of some of our important species. Thus Hinton¹ cites the flour beetle (*Tribolium* sp.) from the tomb of an Egyptian Pharaoh of the 6th Dynasty, about 2500 B. C. Specimens of the drug-store beetle (*Stegobium paniceum* L.), the cigarette beetle (*Lasioderma serricorne* F.), and a spider beetle (*Gibbium*

¹ A Monograph of the Beetles Associated with Stored Products I, 1945, p. 1.

psylloides Czemp.) were found embedded in some substance such as dried resin in alabaster vases in the tomb of Tutankhamen in Egypt, which is believed to have been walled up and sealed about 1100 B.C.² Moreover, Hartnack³ cites the interesting case of an obscure little Colydiid beetle (*Thaumophrastus karanisensis* Blaisd.) being described as a new species from an Egyptian tomb. Not until 1938 was it discovered alive, and then in a rice mill in Texas! A pest control operator would have had an interesting time in early Egypt!

From a later period, about 500 B.C., the Book of Job mentions moths in clothing. Plautus, a Roman dramatist, about 200 B.C., refers to "curculio" in grain; and Vitruvius, a Roman architect who lived in the first century B.C., gave directions for orienting the granary to the north or northeast, to minimize damage from the "cornworm" and other little animals which damage the grain.⁴ So house pests and stored product pests have been a continuing problem throughout most of recorded history.

* * *

At this point it may be enquired how an insect becomes a pest. In the entire field of entomology, there is almost only one reasonably fully documented example of such an occurrence. For our purposes, it is, perhaps, unfortunate that the example is not a household insect. Nearly all our major household insects were well-established pests before the science of entomology had become well enough developed to make precise observations. Accordingly, we shall have to be satisfied with an example from another field of economic entomology, the Colorado potato beetle (*Leptinotarsa decimlineata* Say).

The potato itself originated in the Andes Mountains of South America, whence its cultivation spread, following its discovery by Europeans in the

16th century. It was one of a number of closely related plants ranging up and down the great mountain chain that is the back bone of the American continent. In the far north in Colorado, the Colorado potato beetle evolved on one of these plants, and here it was discovered and described by the American naturalist, Thomas Say, about 1825. Meanwhile, the cultivation of the potato had been introduced into North America and was spreading slowly westward as the white man extended his occupancy of the continent. Finally, but we do not know exactly when, the area of potato cultivation came into contact with the original home of the Colorado potato beetle and the beetle extended its feeding from its original food plant to the potato. It first attracted attention in Nebraska in 1859. In 1861 it was in Iowa, in 1865 in Illinois, and by 1874 it was at the Atlantic Coast from Connecticut to Maryland, and eventually came to occupy nearly the entire potato-growing area of the continent. It got into eastern Washington in 1910, but so far has not been found west of the Cascade Mountains. As early as 1877 it had been intercepted in the process of being introduced into Europe, but the infestations were overcome until 1922, when it finally became established in France, spreading to Switzerland, Netherlands, and Germany, and has recently been the source of recriminations on the part of central European communists, who have been accusing the Americans of promoting its spread behind the Iron Curtain.

I have considered the Colorado potato beetle thus in detail, because it represents a paradigm of an insect becoming a pest which may be applied *pari passu* to other species as well. Five stages in the process may be analyzed.

First, there is the insect in its native environment, minding its own business and doing nobody any harm. The Colorado beetle was in this stage most of the time up to 1859. Most insect species never pass out of this phase, but remain permanently of no practical human concern.

Second, man produces some change in the original area of occupancy of the insect, so that the insect is able

² Reed and Venizant, U. S. Dept. Agric. Circ. 635, 1942, p. 2 citing A. Alfieri, Les Insectes de la Tombe de Toutankhamon, Soc. Roy. d'Egypte 1931, pp. 3-4, 188-189.

³ Unbidden House Guests 1943, I, p. 35.

⁴ Book VI, Chapter 4, after Hartnack, *Unbidden Houseguests* 1943, I, p. 99.

to extend its activities. This is the one stage lost to the record so far as the Colorado potato beetle is concerned: the years previous to 1859, when potato culture was being carried on in the same area in which the beetle was living on its original host plant. Eventually, the beetle spread from its wild host to its cultivated one, and a new pest was born. Among Pacific Northwest insects, one can mention the western tent caterpillar (*Malacosoma pluviale* Dyar), and among household pests, the carpenter ant (*Camponotus herculeanus* L.) and the damp wood termite (*Zootermopsis angusticollis* Hagen) as examples of species in this early stage of their development as pests. They have found certain of the conditions provided by man suitable for their operations, but they have not spread beyond the geographical area to which they were native—a fact that does not, of course, prevent them from being serious pests where they occur. It must be clear that it is not here predicted that these particular insects will ever spread out. As the matter stands it seems quite probable that there are environmental factors of some sort that may keep these species from extending their range. If they were going to spread, they would probably already have done so, but one can never be sure.

In this connection, it should be emphasized that the chances of making adequate observations on a potentially widely dispersable pest in this preliminary stage of its development are not very good. Things happen too quickly and, in many cases, too unobtrusively. Favorable conditions for the spread of the species from its native to its man-provided habitat occur, the insect makes the extension of its habits, and, before anyone, or at least, before any trained observers have discovered what is happening, the insect is off on its new career.

The third stage in the development of a pest is represented by the Colorado potato beetle during the two or three decades following 1859 in which it was extending its range over the greater portion of the central and eastern areas of the North American continent. Having discovered a great new habitat, all it uses are its normal powers of reproduction and migration

to spread out in uncounted numbers in every direction. Eventually, however, it tends to reach barriers which it is unable to surmount. Thus, the Colorado potato beetle was limited in its distribution by the colder climate on the north, the warmer climate in the south, the mountains on the west, and the Atlantic Ocean on the east.

The fourth stage in the development of a pest is represented by the Colorado potato beetle in the Pacific Northwest and in Europe. It is the stage in which the insect takes advantage of man's propensity to move himself and his products around over the surface of the earth and thus is able to extend its occurrence to many parts of the world it would be quite unlikely to reach if restricted to its own natural powers of migration. Even yet, the Colorado potato beetle has not succeeded in surpassing the Cascade Mountains into western Washington.

Most of our North American household pests belong in this fourth classification. With the aforementioned exception of some of our wood-infesting forms, our household insects are largely species that first invaded human habitations in distant parts of the world and have been distributed by artificial means into our region.

The fifth and last stage in the development of a pest is one at which the Colorado potato beetle has not yet arrived. It is in fact a stage that very few of our pests of any sort have attained—the stage at which the pest form has become structurally different from its original wild ancestor and has become a distinct species entirely confined to the conditions provided by man. The twelve thousand years during which man has lived in relatively advanced communities have been too brief to permit such evolution to occur. If and when human societies attain the same geological antiquity as have the ants and termites—an antiquity measured in millions rather than in thousands of years—we may well expect similar distinct species of insects to have evolved in adaptation thereto—unless, by that time, we have discovered such perfect methods of control that insects are permanently eliminated from our midst! Meanwhile, we have only the sucking lice and the bed

bugs as distinct insect species adapted to man—both probably acquired by him during his paleolithic phase. Another possible exception is mentioned by Hartnack,⁵ who suggests that one of the spider beetles (*Mezium americanum* Lap.) may be an indoor variety of another species (*Mezium affine* Boield.) If this is actually so, it is very interesting, but the matter would seem to warrant further investigation.

* * *

It is now proposed to enquire into the original out-door habitats from which the household insects have come. The leading publication on the subject is a technical paper published in 1944 by Professor E. Gorton Linsley of the University of California on *Natural Sources, Habitats, and Reservoirs of Insects Associated with Stored Food Products*,⁶ and many of the observations that follow immediately are from this source. A number of types of habitats are mentioned by Dr. Linsley as furnishing most of the stored product species.

1. Seed-infesting species. Plant seeds are the breeding places of certain insects, and such pests as the granary and rice weevils (*Sitophilus granarius* L., *S. oryzae* L.) and the pea and bean weevils (*Bruchus pisorum* L. and *Acanthoscelides obtectus* Say.) and others have such an origin.

2. Many species of insects that occur in stored food products are fungus feeders, frequently eating the microscopic mould that tends to develop in damp places. Springtails (Collembola), the book louse (*Liposcelis divinatorium* Mull.), and many of the smaller beetles (Cryptophagidae, Lathridiidae, Mycetophagidae, and *Alphitophagus* and *Alphitobius* in Tenebrionidae) apparently belong in this category.

3. Scavengers on dead plant materials. Cockroaches, silverfish (Thysanura), and the flour and meal moths and the dried fruit beetles (Nitidulidae) belong here. In the case of most of the beetles infesting ground meal (Ostomidae, Cucujidae, Tenebrionidae) the original locus of operation of the pests is under bark, where they

feed on the plant debris that accumulates in such places.

4. The larger and carpet beetles (Dermestidae) and the clothes moths (Tineidae) originally were scavengers on dead animal remains of various sorts. In certain cases the nests of bees, ants, and wasps have provided caches of animal materials on which one or another of our pest species feed. Carpet beetles and spider beetles (*Ptinus*) have been found in bees nests living on pollen, which is so rich in protein as closely to resemble animal material.

5. Wood-eating and wood-boring was the original habit of a number of our pests. Some of them like the termites, carpenter ants, and some of the wood-boring beetles, invade the wooden structures or wood products in our buildings, and carry on there almost exactly as they do outdoors. Others, like the spider beetles (Ptinidae), the drug-store and cigarette beetles (*Stegobium paniceum* L. and *Lasioderma serricorne* F. in Anobiidae), and the lesser grain borer (*Rhizopertha dominica* F.) have quite other habits in their association with man, having become stored product pests.

6. The sucking lice and bed bugs. These insects, as previously mentioned, are in a slightly different case than those just treated. They belong to distinct species not found anywhere except in association with man. The clue to their origin is, however given by noticing the habits of those non-human species most closely similar to the human types.

In the case of the sucking lice,⁷ the species infesting man belong to the natural family Pediculidae. This family includes three genera and is exclusively confined in its distribution to apes, monkeys, and humans. The genus *Pedicinus* is found only on monkeys. The genus *Pediculus* includes three species: the head and body louse (*P. humanus* L.), a second species (*P. mjobergi* Ferris) on the spider monkey of South America, and a third species (*P. schaffi* Fahrenholz) on the chimpanzee. The third genus *Phthirus* includes the crab louse (*Ph. pubis* L.) and a second species

⁵ Unbidden House Guests 1943, I, p. 225.

⁶ Hilgardia XVI, 1944, pp. 187-224.

⁷ Herms, Medical Entomology ed. 3, 1939, p. 105.

(*Ph. gorillae* Ewing) on the gorilla. The conclusion may, I think, be fairly drawn that man inherited his sucking lice from his ape-like ancestor, and entomology is thus seen to contribute evidence to the theory of human evolution.

The case of the bed bugs is quite otherwise.⁸ Here the three species parasitizing man belong to the genus *Cimex* in the family Cimicidae. Other species and genera in the family are largely confined to bats, barn swallows, swifts, martins, and poultry. Because the bats and some of the birds frequent caves, it has been suggested, as previously mentioned, that man may have acquired his bed bugs during his cave-frequenting days. It is likewise possible, however, that the bats and birds may have been attracted to some of the artificial shelters that man may have constructed for his use at a very early stage in his history.

* * *

Next, the matter of the geographical origin of our household pests may be raised. This is a large subject, and there is occasion here for only a brief consideration.

First, how can one locate the original home of a pest, when, like the *Tribolium* flour-beetle, it may have been associated with man for the last four or five thousand years? The point of departure is the biology of pest insects in a typical locality like western Washington. The overwhelming majority of the household insects do not occur in this region apart from direct association with man. The cockroaches, the meal worms, the granary pests, most of the spider beetles, the drug-store and cigarette beetles are found only in connection with houses and store-houses. It is obvious that they are not natural members of the Northwest insect fauna, but have come in from outside. When, moreover, the survey is extended from the Northwest to elsewhere, to eastern North America, to Europe, to nearly anywhere in the civilized world, the same situation is, in general, found to prevail. Where then, did the several pests originate?

Two lines of evidence are available as offering suggestions as to the orig-

inal home of pest species. One is to determine where the pest occurs outdoors apart from the operations of man. Thus, the *Tribolium* flour beetles occur under the bark of logs in India, the *Tenebrio* meal worms in similar situations in Europe,⁹ the *Mezium* spider beetles under stones in Morocco and in the neighboring Madeira and Canary Islands.¹⁰ The oriental cockroach was first discovered as an outdoor scavenger in Crimea.¹¹

Such evidence is good, as far as it goes. It must be remembered, however, that it is possible for species to go wild even after extensive man-induced migration, of which, the herds of wild horses in eastern Washington and Wyoming are an example. In accordance with this, the Crimean occurrence of the oriental cockroach just referred to is now rejected as not indicating the original home of that species.

Another line of evidence is offered by the present distribution of wild non-economic species closely related to the pest species. According to the theory of evolution, similar species have a common ancestry, and the evolution of a particular species is most likely to have occurred where related species are most numerous. In human terms, find where a man's cousins are concentrated and one is likely to have an indication of the man's own birth-place. Subsequent migration may, of course, occur both in animal species and in man, so that the results are no more than a general indication.

This was the line of reasoning employed above in seeking to trace the antecedents of man's sucking lice and bed bugs and it was the line of argument employed in eventually tracing the oriental and certain other household cockroaches to North Africa.¹² But it apparently will not apply to the cadelle (*Tenebroides mauritanicus* L.), which is usually traced to the western Mediterranean, even though most of

⁹ Hatch, The Biology of Stored Grain Insects, Bull. Assoc. Operative Millers 1942, pp. 1207-1211.

¹⁰ Wollaston, Coleoptera atlantidum 1865, p. 214; de la Escalera, Les Coleopteros de Marruecos, Trab. Mus. Nac. Cienc. Nat. Ser. Zool. II, 1914, pp. 258-260.

¹¹ Rehn, Man's Uninvited Fellow Traveller—The Cockroach, Sci. Mo. LXI, 1945, pp. 265-276.

¹² Rehn, l.c.

⁸ Herms, l.c. pp. 86-93.

the related species live in South America.¹³

The conclusion, in general, is that the household represents an extension of certain types of tropical and subtropical habitats into temperate regions. In this connection, one will find very helpful portions of Part I of Dr. Hugo Hartnack's book on *Unbidden House Guests*. Man is comfortable only if he can maintain a surface skin temperature of about 90°F. He can do this with relatively light clothing, provided he holds the temperature in his living quarters at 65°—80°F during the daytime. Moreover, he finds it desirable in the portions of his house used for food-storage to keep the temperature somewhat above freezing. Finally, in those buildings or portions of buildings used for growing living plants—frequently of tropical origin—he must maintain a temperature that does not fall even to the night-time limits permitted in his living quarters. These are the ecological factors that cause the household, the storehouse, and the greenhouse to represent an extension of warm-country habitats far into northern regions. Greenhouses in the Pacific Northwest, for instance, are populated by one southern species of sowbug (*Porcellio dilatatus* Br.) and one or two species of tropical spiders not found outdoors in this area.

One reconstructs a striking picture of the original tropical household subjected to the inroads of multitudes of different kinds of insects. Most of these insects, like the earwig with us, found no conditions in the house suitable for their survival there and either died or passed outside again. Others attacked the wooden structures of the house with the same avidity they did natural wood, and others were predators in the household. But it was a selected few of the natural scavengers who found conditions especially to their liking. The food debris in cracks and crevices, the none too securely protected supplies of the food itself, and the clothing and furnishings of animal origin provided an ideal habitat for a number of species. The movement of persons from house to house, the transport of food and fabrics from

house to house, from storehouse to storehouse, and from storehouse to house would serve to spread the insects. At first, the spread would be only within the area of natural occurrence of the species, but eventually it would be to a household or a settlement in a region which the species had not previously inhabited.

An insect, even an insect pest, is in reality a fragile and delicate creature requiring a highly specialized set of conditions for its survival. Innumerable factors, known and unknown, limit both the ecological and geographical distribution of insects in many different ways. Of the thousands of insects in a locality, only hundreds would ever be likely to wander into the house. Of the hundreds that wander in, only dozens or less would, perhaps, be able to take up any sort of residence there. Of these dozens, only one or two in any one locality or, perhaps, none at all, would be able to survive removal from their natural area of distribution. It is out of these fantastically rare exceptions that the pest-fauna of the world is composed.

It is necessary here to urge how much really still remains to be discovered in the matter of the factors determining the range of pest insects. Hartnack¹⁴ has called attention to the unaccounted fact that the most abundant European carpet beetle, (the dotted carpet beetle, *Attagenus pellio* L.) had not up to 1943 become fully established in North America, despite the circumstance that it has been frequently introduced. The lesser grain borer (*Rhizopertha dominica* F.) though considered "cosmopolitan," does not normally occur in North America north of the latitude of Denver and New York City. In fact, of the 37 species of grain beetles considered "cosmopolitan" in 1937 by Cotton and Good¹⁵ only 22 or 59% had been found in the state of Washington up to 1942. The need for more data of this sort is one reason why Pest Control Operators and householders should send in to their local entomologists specimens of any strange or uncertainly identi-

¹⁴ I.e. I, p. 86.

¹⁵ U. S. Dept. Agric. Misc. Publ. 258, 1937, pp. 52-57.

¹³ Hatch, I.c. p. 1209.

fied species of insects that they encounter.

It was in India, perhaps, that such species as the granary and rice weevils, the flour beetles, and the saw-toothed grain beetle (*Oryzaephilus surinamensis* L.) were acquired. The cadelle (*Tenebroides mauritanicus* L.) and the *Mezium* spider beetles were perhaps picked up by civilization in northwest Africa. The four principal cockroaches, despite the names that associate them with America, Australia, Germany, and the Orient, all seem to have had their original homes in North Africa.¹⁶ The mealworms (*Tenebrio*) and the larder and carpet beetles (Dermestidae) may have been a contribution of the more temperate portion of the Old World. The *Ptinus tectus* Boield. spider beetle may have been acquired by the white man's civilization in Tasmania in the last century. The foreign grain beetle (*Ahasverus advena* Waltl.), despite its common name, appears to have originated in the American tropics.¹⁷ But, as indicated, such conclusions are tentative and uncertain, and should be trusted not in detail, but only as to the general picture they present.

At this point the further question may be raised as to why such a preponderance of our household insects seem to have had a tropical or subtropical origin. First it should be insisted that such is not an absolutely universal rule. The mealworms, the cadelle, and possibly others are traceable to a temperate climate origin. Secondly, there is the ecological fact that the household represents more or less unvariable tropical or subtropical conditions that would be expected to appeal more to a tropical species than to a species adapted to a variable temperate climate, but one hesitates to say whether this is a really sufficient answer.

As human civilization has matured and spread, the picture presented by household pests must have continually changed. Some of the types of change may be noted.

The number of species involved must have continuously increased, as new pest species have been picked up by man's spreading culture. Rarely, if ever, will a pest disappear once it has been introduced, though a once common pest may be greatly reduced in abundance by competition with a newcomer. The decline of the black rat following the introduction of the Norway species is the classic example in point, but the black rat does not become exterminated.

Moreover, with the passage of time, more and more of the pests that can establish themselves in any particular region gain entrance. The Mediterranean flour moth (*Ephestia kuehniella* Zeller), some years ago regarded as the most important insect in flour mills in western Washington, was not detected in the United States until 1892.¹⁸

Again, entirely new pests even yet make their appearance. The broad nosed grain beetle (*Caulophilus latinasus* Say) was first recorded as a pest in 1896.¹⁹ The *Ptinus tectus* Boield. spider beetle was first recorded as a pest in Europe in 1901, in western North America in 1926. Another grain beetle (*Cynaesus angustus* LeC.) did not appear as a pest until 1939.²⁰

Varying cultural practices profoundly influence the pattern of insect incidence. Houses without central heating offer very different conditions for insect life from those with such heating. Houses with large dark unheated attics, or ones with similarly unheated basements, providing a nearly uniform temperature resembling that found in caves the entire year round, present an ecology that is markedly unlike that in a completely modern house in which every corner is neatly finished and snugly heated from one year's end to the next.

There is every reason to suppose that insects have taken their toll of man's possessions ever since ancient times, but it was only with the rise of modern science in the sixteenth

¹⁶ Rehn, I.C. The species are: *Periplaneta americana* L. (American cockroach), *P. australis* F. (Australian cockroach), *Blatta orientalis* L. (Oriental cockroach), *Blattella germanica* L. (German cockroach).

¹⁷ Cf. Hatch I.C.

¹⁸ Back and Cotton, U. S. Dept. Agric. Farm. Bull. 1260, 1938, p. 17.

¹⁹ Cotton, U. S. Dept. Agric. Bull. 1085, 1922, 10 pp.

²⁰ Hatch, I.C. pp. 1209-1210.

century that they came in for much attention, and only since the middle of the last century that they have been subjected to concentrated study. Just now we are in the midst of the discovery of potent and ever more potent insecticides. In the forefront are numerous complex organic compounds involving chlorine or phosphorus, and the effort is to tread the narrow line between most efficiently disposing of the insect and not harming the human.

Fly populations have a remarkable tendency to develop immunity to some of the chlorine compounds. These are nerve toxins operating through the membrane of the nerve tissue. It is possible that relatively slight chemical changes in these nerve membranes can interfere with their exerting an effect. Metallic poisons, such as arsenic or lead, and the newer phosphorus compounds attack the respiratory enzyme mechanisms in a way that the organism may simply not be able to adapt itself to meet. Moreover, immunity to DDT and other compounds appears to develop when an entire population over an extensive area is subject to control. Under these circumstances, the extremely rare mutants that can resist the poison survive and interbreed, resulting in an immune population. On the other hand, where isolated populations only are affected, their control is not being attempted on a community wide basis and immunity does not tend to be induced. Thus there is little danger that our insecticides will lose their efficacy with such insects as stored-food pests, clothes moths, carpet-beetles, or carpenter ants. The populations that are exposed to the insecticide are too limited in these instances to make it at all likely that immunity will be induced. Even if an occasional immune

individual does survive, it immediately breeds with a non-immune individual and nothing happens. But if a technique were developed and applied, as in the case of house flies, to kill every carpet beetle in an entire community, there is reason to suspect that immunity to the insecticide might appear.²¹

As a biologist and an ecologist, the writer's reaction to the insecticide program is that it does no more than establish a temporary and uneasy balance in man's favor in his contest with the insects. As soon as there is any interruption in the application of the poisons, the pests return in full force. A more basic approach to the problem, when it can be employed, is the ecological one, and insecticides would be looked upon as palliative and emergency measures tiding over to the application of the more basic ecological remedies. Building codes relative to termites are an example of what is meant. Crack-proof interior construction throughout the house, including kitchen drawers and pantries, would be a deterrent against carpet beetles and stored food pests of several sorts. The substitution of plastic for woolen fabrics in clothing, furniture, and house furnishings would just about eliminate carpet beetles and clothes moths. Insect resistant food packaging would further discourage stored food species. These are examples of the lines along which the control of household insects may ultimately trend. But big problems, especially in the matter of mills and warehouses, still remain.

²¹ Since this paragraph was written, word has come through of the appearance in Corpus Christi, Tex., of a lindane and D.D.T.-resistant strain of German cockroaches *Blattella germanica* L. (National Pest Control Association Technical Release No. 22-52, Dec. 5, 1952).



Because half a dozen grasshoppers under a fern make the field ring with their importunate clink, while thousands of great cattle, reposed beneath the shadow of the British oak, chew their cud and are silent, pray do not imagine that those who make the noise are the only inhabitants of the field. *Edmund Burke*

PHILIP HENRY GOSSE

By DAVID CAUSEY

University of Arkansas

II. THE GREAT RECONCILER

The Catholic Church has maintained that it is older than the New Testament, that from the time Christ handed Saint Peter the keys and made him leader of the Apostles the church has had a continuous being, rich in knowledge, tradition, and ways. This background of spiritual and temporal continuity and authority is deemed essential by the church. In contrast, from the time of Luther and the Reformation, Protestants have held that the New Testament itself holds all that is essential for an understanding of the doctrine and content of Christianity, and that each may find such for himself independently, not denying, of course, the enrichment which may come from the investigations of scholars. Basically, it seems to me, in Catholicism the church is the authority, in Protestantism, the individual decides.

Gosse was, I believe, first of all anti-Catholic, and then secondly, deeply religious. Why he was so blindly anti-Catholic I have no idea, but from his earliest days he was vitriolic in his statements regarding the Catholic church. His popular writings are marred (by our present day standards) with such references, often dragged in out of context almost as though he were compelled at specific time intervals to make them. He would not enter a Catholic building, and if possible to avoid it would not observe the minimum of social amenities with a Catholic. Edmund repeats a scurrilous jingle he was taught as a child. No trace of tolerance on this subject appears in Gosse's writings.

That he was deeply religious seems clear. Although naturally shy and retiring, he forced himself to be concerned about the souls of his associ-

ates. He preached in backwoods Alabama and on shipboard, he tried to be a Wesleyan minister in England, he did serve as a minister for the Plymouth Brethren. He wrote a number of semi-religious books. As he developed along this path, with his fair knowledge of Latin, his little Greek, and a bit of Hebrew (the second Mrs. Gosse knew something of the language), he studied the Scriptures, and there appeared what I suspect is a weakness in the Protestant position. More and more Gosse came to depend upon what Gosse interpreted the Scriptures to say, more and more he drew away from the studied conclusions of the scholars in the field of theology, Catholic or Protestant. In time he left the Brethren and formed a little church of his own, "The Church of Christ in this Parish," and it would appear that he preached and expounded the Scriptures to the satisfaction of his little group. It seems to me that Gosse ended his spiritual progress by inverting the passage in Genesis, and ended by creating God in Gosse's image!

Edmund discusses this aspect of his father in great detail. He says:

"I have never met with a man, of any creed, of any school of religious speculation, who was so invulnerably cased in fully developed conviction upon every side. His faith was an intellectual system of mental armour in which he was clothed, *cap-a-pie*, without a joint or an aperture discoverable anywhere. He never avoided argument; in the contrary, he eagerly accepted any challenge; and his accuracy of mind, working with extreme precision within a narrow channel, was such that it was not possible to contro-

vert him on his own ground . . . Put in a nutshell, his code was the Bible, and the Bible only, without any modern modification whatever, without allowance for any difference between the old world and the new, without any distinction of value in parts, without the smallest concession to the critical spirit upon any point; an absolute, uncompromising, unquestioning reliance on the Hebrew and Greek texts as inspired by the mouth of God and uncorrupted by the hand of man. The Bible, however, is full of dark sayings, and needs, as he admitted, an interpreter. But my father did not doubt his own competence to interpret . . ." (Life).

It was this man, an able although self-taught scientist who had won recognition from his fellow scientists, a man of broad and scholarly experiences in the biological field in two continents, a man who had or ultimately came to reject all established churches and their concepts of God to establish his own, it was this man who took it upon himself to settle for all time and for all people the approaching conflict between religion and science. It was this religious bigot and broadminded scientist who decided to harmonize the two factors, to effect a lasting reconciliation! I have already indicated my opinion that he was the least fitted man in England to rear a child. I also think he was the least fitted individual I have ever heard of for service in harmonizing anything.

That Gosse was an evolutionist before it became a vital issue, and probably without being conscious of it, seems beyond reasonable question.¹ There are discussions of relationships between groups, connecting links pointed out, passages which could have come out of Darwin or Wallace. Probably no man could have worked as intimately and minutely with so many organisms at that time and escape evolutionary thought (unless he sign-

ed his name "Louis Agassiz"). Owen wrote of Gosse, "Mr. Gosse is a very true observer and a very beautiful describer of what he sees." Gosse stated it more simply in *Tenby*, "I have . . . described them as I see them . . .," and he saw with an evolutionary viewpoint. The time was 1856-57, the *Vestiges of Creation* had appeared and was fascinating many thoughtful people and of course worrying others, and there were rumors of big things in the air, rumors associated with the name of a country squire living at the Downs and best known for a monograph on the barnacles. Edmund says:

"The human mind was preparing for a great crisis of emancipation, of relief from a fettering order of ideas no longer tenable or endurable, and no one was concerned to give even fair play to a piece of reasoning, such as *Omphalos*, whose sole purpose was to bind again those very cords out of which the world was painfully struggling."

Consider once more the approach to the harmonization. Some basic points must be emphasized. One was that the Bible, and for this particular purpose Genesis, was the basic and final authority. It was the living word of the living God, and Gosse acted as though he had the original manuscript signed simply and conclusively with the inscription of the Author, "by God." Not one jot or tittle of this authority could be varied, changed, reinterpreted—to Gosse, maybe an unconscious follower of Spinoza, it was God's work and perfect. Not only this, but in any question coming up, Gosse rendered the decision. Secondly, he brought to the reconciliation an intimate knowledge of so many animals, most recently of the marine animals which he knew as few of us ever know animals—alive in their natural habitats and in his aquaria, in spirits or other media under the microscope or as specimens to be considered taxonomically, minutely and exactly, again and again. Add to that an evident grasp of the geology of his day, especially of paleontology—remember he was accustomed to compile material for his many books on many subjects. I think he was adequately prepared upon the scientific side of the question.

¹ "I am very far, indeed, from accepting Mr. Darwin's theory to the extent to which he pushes it, completely trampling on Revelation as it does; but I think there is a *measure* of truth in it." *Romance of Natural History*, First Series, 1887, 7th ed., footnote, p. 81.

The great work which was to reconcile Genesis and geology, the Mosaic record and the mosaic record, was *Omphalos, an Attempt to Untie the Geological Knot* (1857). Edmund tells us how once it was written and published Gosse waited with quiet confidence for the acclaim which was coming from both the theological and the scientific worlds. Had there been a clipping bureau I am sure he would have subscribed.

"So certain had he been that the whole camp of faith would rally around him, and that all Christians would accept his solution of the problem with rapture, that he ordered the printing of an immense edition, the greater part of which was left upon his hands."

The book appeared and the effect upon the world whose problems he sought to solve was like a shadow falling—he might as well have written it in water. An incidental comment—my copy of the first (and only) edition of *Omphalos* cost a dollar and a quarter!

Grant Gosse's premises and his argument in *Omphalos* is unshakable, all inclusive. It settles the problem once and for all. A minor but fatal defect is that in his day no one was convinced, that while it could be the correct solution, no one but Gosse has ever thought so. It is so simple, Ockham's razor was never so keen, and perhaps never before wielded so deftly by a pseudo-philosopher with two left hands!

Gosse approaches the solution by a discussion of cycles in nature. At this point of cycle means just what you think it does, it has no evident beginning or end—you may start anywhere and go round to where you started. The life cycle of an animal or plant illustrates this. Out of this cycle Gosse developed his reconciliation, his harmonization. God was an evolutionist, but He made a formal beginning some 4,004 B.C. Adam and Eve were created as mature beings, and solving a minor problem which has bothered some good people, each with an umbilicus, with the usual vestigial structures of mankind, no doubt even with all the psychic trauma due to childbirth! That God could have started them as

foetuses, as new born babies, or even as doddering old folk surrounded by their grandchildren is unquestioned. He just didn't, that's all. Gosse developed this consistently, trees created in full maturity and bearing fruit showed evidences of development, of growth and the annular rings, wind shakes and scars from storms that had never been. Mollusca would show growth rings on their shells, fish the same on their scales, marks of time passing and time had just begun! No doubt some of the forms were created relatively younger or older, each showing evidences of experiences they hadn't had, perhaps teeth worn as from years of use, maybe Adam had a scar representing a tumble in the childhood he never knew.

The same explanation holds for the geological record, as told by the sermons in the stones. Had God so willed it, the story could have been that which the geologists tell, with the long sweep of aeons of time, the rise and fall of continents, and more recently the appearance of lowly forms of life to be followed by the successive, progressive panoramas of fauna and flora as shown by the "fossils" in the rocks. But God had created it some 6,000 years ago, and at a particular point in the cycle. What hadn't happened, but would have if the world had been created earlier, all this was included, and so the rocks contained "pseudo-fossils" of pseudoorganisms which could have lived but never did. Some, in what represented the older rocks were imperfect, broken, waterworn, others in rocks represented as not that old were in pretty good shape, and those from what purported to be "recent" rocks were perfect. The stratigraphy was cared for just as carefully, cross bedded sandstone indicated where non-existent cross currents could have flowed in a never existent delta region, sedimentary layers representing long erosion from non-existent highs and deposition in equally non-existent depths, unconformities which indicated profound geological changes which had never happened, but would have were the world older—it was all there. You can't think of a touchstone, a shibboleth to apply which isn't cared for in Gosse's reconciliation—the omnipotent God who created the world

some 6,000 years back didn't overlook a thing. It is fascinating, it covers the whole and has an explanation for anything you think of—God did it that way—and if in my paraphrasing of his thought I have introduced an anachronism or so in geological knowledge the fault is mine and not Gosse's (nor, to keep the record clear, God's!). I trust you see that once Gosse left the present day cycles he had abandoned cycles and dealt in pseudocycles. Everything turns out to be spurious, phony. Edmund thought that his father's theory actually demonstrated "the absolute necessity for some other definite hypothesis of the mode in which the world came into existence than any which assumed the traditional idea of some sudden creative act."

The bitterest pill poor Gosse had to swallow was not the neglect and silence of churchmen and scientists. I have quoted Edmund's opinion that his father's faith didn't have a crevice through which an entry might be made. His old friend, Charles Kingsley, found it. I quote in part from his letter of May 4, 1858:

"Assuming that the act of absolute creation which I have always assumed, as fully as you—shall I tell you the truth? . . . Your book is the first that ever made me doubt it, and I fear it will make hundreds do so. Your book tends to prove this—that if we accept the fact of absolute Creation, God becomes a *Deus quidam deceptor* . . . you make God tell a lie. It is not my reason, but my *conscience* which revolts here; which makes me say, 'Come what will, disbelieve what I may, I cannot believe this of a God of truth, of Him who is Light and no darkness at all, of Him who formed the intellectual man after His own image, that he might understand and glory in his Father's works.' . . . I cannot give up the painful and slow conclusion of five and twenty years' study of geology, and believe that God has written on the rocks one enormous and superfluous lie for all mankind."

If you were Gosse, if you believed yourself the only man capable of reading God's Holy Writ and knowing what it meant, the only man theologically

sound in a world of imperfect men whose unsound theology stank to high heaven, could you laugh it off when a trusted friend told you that your book, your theory, your great reconciliation which was to bring harmony to mankind made God out to be a liar? No wonder Gosse began to withdraw from the world. He never quite gave up, and in *A Year At The Shore* (1865) he says:

"I cannot conclude this volume without recording my solemn and deliberate protest against the infidelity with which, to a very painful extent, modern physical science is associated. I allude not only to the ground which the conclusions of modern geologists take, in opposition to the veracity of the "God which cannot lie," though the distinct statements which He has made to us concerning Creation are now, as if by common consent, put aside, with silent contempt, as effete fables, unworthy of a moment's thought, and this before vast assemblages of persons, not one of whom lifts his voice for the truth of God. These assaults are at least open and unmasked. But there is in our scientific literature, and especially in that which takes a popular form, a tone equally dangerous and more insidious. It altogether ignores the awful truths of God's revelation . . . It substitutes for these a mere sentimental admiration of nature, and teaches that the love of the beautiful makes man acceptable to God and secures His favor . . ."

One more sentence from the same:

"If I have come to God as a guilty sinner, and have found acceptance, and reconciliation, and sonship, in the blood of His only-begotten Son, then I may come down from that elevation, and study creation with advantage and profit; but to attempt to scale heaven with the ladder of natural history, is nothing else than Cain's religion . . ."

Two years after *Omphalos* appeared the *Origin of Species* was published and the real fight began. I close with a comment of Edmund's:

" . . . he left his own field of research, that field in which he was

gathering such thick and clustering laurels, to adventure in a province of scientific philosophy which lay outside his sphere, and for which he was fitted neither by training, nor by native aptitude, nor by the possession of a mind clear from prejudice . . . In 1857 evolutionism was crude and vague; a positive naturalist might well have been permitted to ignore it. But, unhappily, my fa-

ther's conscience tortured him into protest, and he needs must break a lance with the windmills of the geologists."

There was considerable in common between the Knight de la Mancha and the Squire at Marychurch, Torquay—with this difference, perhaps—one had read too many books and the other had misread one Book too often!



OFFICE NOTES

An erasure on a pencilled draft, indicating indecision regarding the plural of "syllabus," was the occasion for these lines by Kit Berry, a recent addition to the Council's secretarial staff.

O SYLLABUS, O SYLLABI

Servitudo Scholastica Grandiflora

"The Oxford don, with brow so high,
Pronounces it 'gladioli,'"
And Cambridge, Mass., aspiring higher,
Builds Babel's tower the heavens nigher.

O syllabus, O syllabi.

O octopus, O octopi.

The antique hybrids still appear,
With Grecian front and Latin rear,
Embodied in our English tongue
By no true graft, but stiffly hung,
Mere fossils from an ancient lore,
Which learning with less effort wore,
And, when it grafted, grafted true,
And made a hybrid live and new.

O syllabus, O syllabi.

O omnibus, O omnibi??

Yet it has been said by a liberal scholar that "Culture is *forgotten* learning," and by a prophet that "The letter killeth, but the spirit giveth life."

*From "The American Council of Learned Societies
Newsletter," Vol, III, No. 3, Summer 1952.*

SCIENCE AND PHILOSOPHY

By GERARD SMITH, S. J.

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There is a clumsy collision, to borrow a Chestertonian description¹ of quite another matter, there is a clumsy collision of two very impatient forms of ignorance known as the quarrel of science and philosophy. Private and premature theories of scientists about philosophy ought to be, as private and as premature theories of philosophers about what science ought to be, are meeting as never before with a jolting impact which leaves the theorizers quivering with anger. Their white knuckles gripping chairs would be as bloody as they are white if philosophers and scientists were not, to date, still observing the ordinary amenities of life.² Only one who has never attended their symposia will consider fanciful the likelihood of philosophers and scientists one day coming to blows if they dared.

This situation where wisdom itself is at stake deserves some comment.³

It is a bald fact that from the 17th century on we have made such progress in science as to dominate our environment, raise our standards of living, cause a leisure for enjoyment, and thus create in us an ineffaceable impression that we are far better off than any former generation of men ever was. It is a bald fact, furthermore, that this magnificent progress in science was furthered, if not made possible, by scientists equivalently telling philosophers to mind their own

business and leave science alone. Indeed, one might say that the beginning of scientific wisdom was the fear of philosophy.⁴

As incontestable as the progress of science and its cause is the bald fact that philosophy, which even scientists have never forsworn, begins in a dissatisfaction with, if not a fear of, scientific wisdom. "I might compare him," writes Plato, speaking through the mouth of Socrates about one who explains things scientifically, "I might compare him to a person who . . . when he endeavored to explain the causes of my several actions in detail, went on to show that I sit here because my body is made up of bones and muscles; and the bones, as he would say, are hard and have joints which divide them, and the muscles are elastic, and they cover the bones, which have also a covering or environment of flesh and skin which contains them; and as the bones are lifted at their joints by the contraction or relaxation of the muscles, I am able to bend my limbs, and this is why I am sitting here in a curved posture—this is what he would say: . . . There is surely a strange confusion of causes and conditions in all this. It may be said indeed that without bones and muscles and the other parts of the body I cannot execute my purpose. But to say that I do as I do because of them, and that this is the way the mind acts . . . is a very careless and idle mode of speaking."⁵

Thus we have it that science charges philosophy with having contributed nothing to the visible advantages of

¹ G. K. Chesterton, *St. Thomas Aquinas*, Sheed and Ward, N. Y., 1933, p. 48. Chesterton's description is of the conflict between science and religion, but it fits, proportionately, the conflict between science and philosophy.

² For resounding echoes of one of these impacts see *The Daily Maroon*, Thursday, Nov. 14, 1940, 5831, University Ave., Chicago, Illinois.

³ My comment will draw heavily upon some of the ideas in E. Gilson's *God and Philosophy*, New Haven, Yale University Press, 1941. Should the paraphrase be only more or less faithful, the fault is mine.

⁴ Cf. *Op. cit.*, p. 129: For centuries, final causes have been mistaken for scientific explanations by so many generations of philosophers that today many scientists still consider the fear of final causes as the beginning of scientific wisdom.

⁵ Plato, *Phaedo*, 98 ff. Jowett's translation.

science, with having in fact lain as an incubus upon scientific effort, and, to top it all, with talking down to science by calling its explanations idle and careless. Philosophy, on the other hand, continues to repeat in various forms the Platonic charge that scientific explanations about matters philosophical are idle and careless.

The point of debate between scientists and philosophers seems to be over the adequacy of their respective explanations of reality. Let us take the Platonic example of reality. It has at least the advantage of not being allocated to the vague area of "what neurotics are not adjusted to." You are sitting there reading this. Why? A scientist considers it a meaningless answer to say that you are sitting there because you *wish* to, as if that upon which you are sitting had nothing at all to do with the matter. As idle to the philosopher is the scientist's answer that you wish to sit there because you have something to sit upon. In truth, both science and philosophy seem in this case to be right in their affirmations and wrong in their denials. To get at the bottom of the matter, one cannot, with the best will in the world, sit down upon nothing; here science is right. Nor need one, apart from force, though he be possessed of the most elaborate fundament in the world, sit down if he does not wish to; here philosophy is right. Both science and philosophy are wrong in thinking that its own explanation quite covers the matter. Both are right in thinking that if the other's answer is assumed to cover the matter, its own field will be destroyed; it will indeed be destroyed. Both are wrong in assuming that its own answer does quite cover the matter; it does not.

May it not be suggested, then, that the way to compose the differences of scientists and philosophers involves no more difficulty than seeing that each is asking a different question, that these questions are legitimate and necessary, that science can never answer philosophy's questions nor can science ever answer philosophy's? Whether such a solution be simple to the point of being simple-minded, the reader may judge for himself by exam-

ining the following conflict of scientists and philosophers *in vitro*.

Dr. Franz Alexander defines philosophy thus: "An attempt to integrate the isolated and disconnected answers of science into a *Weltbild*. This is philosophy."⁶ (Such a description of philosophy by a scientist is rather typical. When he is not denying validity to any sort of philosophical knowledge, a scientist is usually graciously content to leave to philosophy at least the task of trying to tie together the conclusions of science). A conclusion of science, according to Dr. Alexander, might be instanced as follows. "Even though scientists are not able to reduce the processes of life to physics and chemistry there is not a doubt that the process of life consists in a specific combination of exactly the same processes as are known in the physics and chemistry of non-living substances. The specificity of life consists in the specificity of the combination of those partial processes which constitute life and which are identical with the chemical processes of non-living substances. It is true that the specific principles of this combination are not known as yet. Nevertheless it is quite possible that some time in the future when we shall possess the knowledge of the characteristic combination of physico-chemical processes in the living cell we shall be able to create living substance from non-living substance."⁷

If I do not misunderstand Dr. Alexander, we are to take this "conclusion" of science, to the effect that the specificity of life consists in the specificity of the combination of chemical processes of non-living substances, put it alongside of other similarly scientific conclusions, try to see what it all adds up to, and then we shall be philosophers.

Let us try to do this. Sir James Jeans in his *The Mysterious Universe*, after suggesting that "before philosophers have a right to speak, science ought first to be asked to tell all that she can as to ascertained facts and

⁶ Dr. Franz Alexander in *What Man Has Made of Man*, by Mortimer J. Adler, Longmans, Green and Co., 1937, p. xii.

⁷ *Op. cit.*, p. xiv.

provisional hypotheses," reports as follows about what science "can at present inform us" concerning "the surprising manner in which we came into being." We came into being, according to Sir James Jeans, thus: of two of the innumerable stars which wander in space there was, some two thousand million years ago, a collision. One star came near the sun, causing a tidal wave, exploded, and turned into planets, of which one is now the earth. Then "in the course of time, we know not how, when, or why, one of the cooling fragments gave birth to life."⁸ Put now Sir James' conclusion alongside of Dr. Alexander's: life, which is the result of an astral collision, date unknown, is a specific chemical combination, as yet unknown, of non-living substance. We may add for good measure to these two, another "scientific" conclusion of J. Huxley's: "there are vast powers of inorganic nature" which "gave birth to evolving life whose development though blind and fortuitous . . . gives birth to . . . mind which, in the race, is changing the course of evolution by acceleration . . ."⁹ Let us now put all this together: expressible by a chemical formula, life is the result of vast powers of inorganic nature, a result, e.g., of a collision of stars. What are we to make of that? If we do not go beyond the data supplied by these scientists, we make just this: (1) since life is a formula, (2) since it comes from the non-living, life originates because it is life, and there is a good deal more of it than you would ever think; so much more, in fact, that the living is non-living. We are philosophers.

It may be suggested that we are not even scientists.

Science can scarcely ask of us an act of faith upon testimony which professes ignorance. Faith is not science, nor is professed ignorance testimony. Dr. Alexander writes: ". . . though scientists are not able to reduce . . . life to physics and chemistry *there is no doubt* that the process of life consists in a specific combination of exactly the same processes as are

known in the physics and chemistry of non-living substances . . .; . . . true . . . the specific principles of this combination are not *known as yet* . . . nevertheless it is *quite possible* that . . . we shall be able to create living substance from non-living substance."¹⁰ Boil all that down: though we don't know, we don't doubt; though the thing is only possible, it is nevertheless true; in sum, this is so, although I do not know it is so. Jeans writes: "then in the course of time, we know not how, when, or why, one of the cooling fragments gave birth to life." Huxley writes: "vast powers gave birth to life." Strange answers these to the question, whence came life? It came from "non-life" or from a "then" or from "vast powers." They quite resemble the following answers to the question, who wrote the *Anabasis*? It was written "then" (Jeans); it is the *Anabasis*; it has a chemical formula (Alexander); vast inorganic powers did it (Huxley). Thus professing an ignorance which it should dispel, science is here asking us to accept as answers to the question, whence came life, many statements, of which not a single one is scientific. The statements rather represent an honest, if desperate, effort on the part of scientists after a hard day's work to philosophize.

Extraordinary philosophy it is, no less bizarre than the science from which it issues. Whether life come from non-living substance, as both science and philosophy had once thought; whether life comes from the living, as both philosophy and science, after Pasteur, now believe; whether life comes from the non-living, as the above scientists—against, be it noted, the testimony of science itself, are now asserting; all that is somewhat irrelevant to philosophy.

Philosophy is concerned with two questions: Why do the elements of the chemical formula, if any, of life combine as they do? Why, secondly, do the elements of any given combination *exist*? An answer to either question would involve, philosophically, an answer to both. The reason is, to know why a combination, or its elements, exists is to know life or anything

⁸ London, Macmillan, 1932, pp. vii, 3, 13.

⁹ *Essays of a Biologist*, New York, Knopf, 1923, p. 220.

¹⁰ I.e., italics mine.

else in terms of its first causes, and that is philosophical knowledge. We may, then, focus still more sharply the area of philosophical interest thus: philosophy wishes to learn why things exist.

The question is so peculiar to philosophy, so foreign to, and even useless for, scientific interests, that it is difficult to understand even so much as what is being asked. When one asks why the living differs from the non-living, and why there is the living, it would seem a sufficient, plain, and forthright answer with no metaphysical nonsense about it, to indicate the differences between the living and the non-living, and to advert to the antecedents of the living. Thus, the living differs from the non-living by reason of these characteristics: irritability, nutritive and reproductive functions, etc. Let us say in short, the living has a formula which the non-living does not possess. Let us grant all that is scientific here. (That the living has a formula is not yet scientific, but let us grant it.) Furthermore, the living exists because it comes from the living, or perhaps from the non-living: the chicken comes from the egg or maybe from a stone. Let us grant this also, even though we must scientifically concede only the chicken from the egg. These are the answers of science, and good enough answers they are. They do not completely satisfy philosophy. Philosophy wishes to know, first, why it is the living which its distinguishing characteristics distinguish. (Even the sentence participates in the obscurity of the question. I know). Philosophy wishes to know why the distinguishing traits of the living would not also distinguish the non-living. Would, in other words, would the non-living, if it had the same traits as the living, be *still* non-living? The question cannot be escaped by shouting that the non-living cannot have the same traits as the living; because, after all, the living has those traits, and our scientists are asserting that the living (which has the traits of the living) is the non-living (which have not the traits of the living). Secondly, Philosophy finds that to explain progeny by parents only raises the question concerning parents: why do they, the

parents exist? Because *they* had parents? Then what about the parent of parents, and what about their parents?

One can quite understand the annoyance which such questions cause to a scientist. He, meaning no harm, and talking good sense up to a point, says that X differs from Y because X has characteristic B, and Y has not; or, because X is X, and it is not Y. Why, then, all the bother? The scientist complains. The bother is about this: the scientist is telling us what things are and what they are from, and *he* thinks that his answers tell us why what-things-are are. They do not. A scientist's answers are to a different question, although he may not realize this.

The following are scientific questions. What are the relations, verifiable in sense experience (physics) or in the constructive imagination (mathematics), of numbers and continuous quantities? What will be the impact of a given body, travelling at a given speed, upon a given target? What are the laws of aero-and thermo-dynamics? What are the distinguishing traits, taxonomic, aetiological, mathematical, if any, of the *bacillus anthrax*? And light? Sound? Electricity? What is all this in terms either of what it feels like, or its measurements, or its intelligible being? These are the questions of science, and very necessary they are. Of enormous value to mankind, the answers to them, when disentangled from theory and especially from pseudo-philosophical science, are doubtless *d'acier*.

Philosophy has a different interest. Philosophy wishes to know, not what things are in terms of their intelligibly sensible or imaginable predicates, but rather why those predicates attach themselves to their subjects, and why, most of all, 'do those subjects exist. Science focuses intelligible areas: bad oysters make you sick. Philosophy begins by wondering why these areas are focussed; why, e.g., was the oyster bad, and for that matter why was there an oyster at all? Clearly, an existent need not be a bad oyster, since there are good ones. Clearly, there need not have been any oyster at all; there was none when you got sick from bad meat. Why are things here rather than there, animal

rather than mineral, George rather than John? Why, indeed, is there any of these things at all? These are philosophy's questions. Science tells us about e.g., a right angle, in terms of right angularity. Philosophy purports to tell us about, e.g., a right angle, in terms, not of right angularity, but in terms of a right angle's being. What is being when it is a right angle? That is a question of science. What is a right angle when it is being? That is a question of philosophy. So for the living, Philosophy wishes to learn, not what being is when it is alive, but what is the living when it is. That there are living beings, right angles, and ships, and shoes, and sealing wax is a safe assumption in science. It is this very assumption, so familiar that we must make a violent effort even to understand it—like the effort of one who has always seen black on white, suddenly to see white on black —, it is this very assumption which philosophy examines.

It is a legitimate examination. Never in the world will one succeed in telling us why there is a good meal by telling us what goes into it. A good meal is indeed whatever good recipes prescribe. But good meals need good cooks. So for planes, tanks, and guns. There they are. Why? Because they are contraptions built according to the laws of aero-and thermo-dynamics? Obviously. But not only. There they are also because we built them. And if life comes to be manufactured as is synthetic rubber, then life will be made as is synthetic rubber: by us. Nevertheless, even in that, as yet, slightly unscientific hypothesis, life will not be explained by saying that it is a formula. You must add, it is a formula which we discovered and thereafter concocted. When you add that much, you are saying something which *can* make sense, even though it does not, as yet. It cannot make sense to assume that a combination of elements is necessary. The reason is: if a combination is necessary, why are its elements sometimes uncombined? If there *must* be the living, why is there the non-living? Because the living is the non-living? If we say *yes* to that, we only succeed in saying that the distinctive formula of the living does not really distinguish it from the

non-living. Nor can it make sense to say that, apart from our intervention, which until now has not been notably successful in creating life, the elements of the formula of life simply happened to get stuck together and thereafter stayed stuck. By appealing thus to the chance or accidental fusion elements, we are destroying the very notion of chance itself. A chance event is at least a deviation from the normal. There is no normal if all is chance, no more than there is any counterfeit if *all* money is counterfeit, or insanity if *all* men are insane. If all combinations come by chance, there is not even a chance that they could come: This is to say that they cannot come at all. Chance can come from design, but design, cannot come from chance.

Legitimate also is the philosophical examination from the viewpoint of the existence of the elements themselves: why do the elements exist? It is idle to attempt to explain the chicken's existence from the egg's existence. True, one can explain thus the generation of a chicken. Parents explain why there is one more like them. They do not explain why their progeny, whose generation they do explain, exists at all. They do not explain this, because they do not explain why they themselves, who had their parents, who had *theirs*, exist at all. As Gilson remarks, what on earth anything is, receives an answer from something on earth like it. Why anything is on earth receives no explanation by saying what on earth is like it.¹¹ To say that the egg exists because the hen did is to be satisfied with saying that X is because there is a lot of it. An answer exactly like the one given by a flustered motorist to an irate cop who wished to know why he tooted his horn. "I always toot," was the answer. Positively, the reason why existents in our experience are not self explanatory is because their existence is a predicable accident—"is" may and it may not affect a subject of existence. This we know because we know that the ways of existing vary: e.g., things are here or there, animal or mineral, George or John. Now, the

¹¹ Cf. E. Gilson, *Op. cit.*, pp. 68, 70, 71, 119, 126, 127.

ways things exist are nothing if not the things existing in those ways; and since the ways of "being" vary, the "being" itself which is these ways of being, could possibly not be at all. If, then, the "being" nevertheless is, the question why it is becomes pertinent. Thus, "even the local displacement of a body marks the intrinsic mutability of a body which changes place, so that, in a way, the possibility of ceasing to be where it is attests a possibility of its ceasing to be what it is." More, "movement is seen to involve . . . the radical contingency of the very existence of beings subject to becoming."¹²

No doubt these are obscure questions, as obscure indeed as is the subject of their inquiry, being. Philosophy is quite content to leave a mystery mysterious. A pseudo philosophical science seems bent on destroying itself along with the mysteries. Why does the combination or its elements exist? Because, says Dr. Alexander, the combination is specific. Now, this is to say that the combination is a combination, that life exists because it is life. Jeans and Huxley say that life exists because of a "then" or "vast powers." This is to kill two birds with one stone, to make our answers as unphilosophical as they are unscientific.

The same goes for philosophers, some of them. They also can give answers which write off at one stroke both science and philosophy. They do this whenever they try to explain what things are in terms of the causes of those things.

Admitting a proposition, axial in philosophy, to the effect that physical, cognitive, and volitive operations, as well as the operants themselves, are caused *ab extra* (should that proposition be denied, philosophers would not have any philosophy whatsoever to write off), some philosophers conclude that since all these data are caused, therefore operants do not really operate nor, for that matter, have they any existential status, any being, which they can call their own. The cause has "moved in" and usurped the place of operants and their operations. With no operants or operations

left to talk about, such philosophers then strive to wring from causes alone, which are the reasons why things are, the very factors which can be found only in the caused itself, viz., what things are. Then they will begin to talk darkly about the will of God or the will of the people, as if these wills, which are proportionately existential causes of things, dispensed us from investigating what the will of God has willed, and whether the will of man has willed something worth willing. They will also talk about matter and form as if these factors of sensible being were calculated to define differences of body—being, and *not* to explain why bodies, whatever be their differences, are definably different. It is amusing to see them go on thus in their treatises about the vital principle. When a scientist, bewildered by such treatises, suddenly come to and realizes that philosophers are merely saying that it is by some principle, call it what you will, that different things differ; that the living, in short, is *not* the non-living; then these philosophers, not realizing that this is precisely what they *are* saying (and that is sane to say it, insane to deny it), will feel that their efforts have somehow missed fire. They did indeed, but only because those philosophers mistook a very sound reason why things differ for a definition and not the definability of differing beings. And when they go on to biologise the inorganic,¹³ they wonder, these pseudo philosophers, why science develops an acute state of indigestion over "igneity," "jugginess," "equinity," etc. We all recall many a scholastic treatise on the *Soul-Body* problem. Such treatises usually define soul and body accurately enough: the soul, as the "first entelechy of an organic body having life in potency;"¹⁴ the body, as organizable matter. Then, discovering that the body is a carbon compound of great complexity, they ask, why is the body, this carbon compound, an incomplete substance? The question is about as sensible as its answer is bound to be. As if the body, thus de-

¹² E. Gilson, *The Spirit of Mediaeval Philosophy*, Sheed and Ward, pp 67-8.

¹³ Cf. E. Gilson, *Le Realisme Methodique*, Tequi, Paris, p. 64.

¹⁴ Aristotle, *De Anima*, II, 1.

finied, were an incomplete substance! One can quite understand why a scientist makes nothing of these pseudo questions and answers. One can understand it because a scientist finds not only that the questions are pseudo-questions, but he also finds that even the real philosophical questions and their answers are useless to him and for his purposes. But when a philosopher adds to a scientist's difficulty by so explaining Aristotle's meaning as to explain it away, there is small wonder that a scientist is content to conclude that Aristotle did not mean anything to start with. And if he whose name is as much philosophy's adjective as Cicero's name is the adjective of eloquence, if he talked nonsense, what about others? *Si hoc in viridi* . . . One can hardly blame sociologists, physicists, economists, statesmen, chemists, etc., for their irritation at, and positive abhorrence of, pseudo-philosophers. The scientists are seeking the knowledge of the laws of their respective fields. As a substitute for such knowledge, they are offered by pseudo-philosophers the knowledge that laws, even scientific laws, involves will, finality. They do indeed. But to know that much is not to know what the laws are, and it is a pseudo philosophy which would try to make us think so.

The advantage of this pseudo philosophy is exactly the same as the advantage of a pseudo science: each makes the other's explanation unnecessary. The advantage is questionable. Pseudo philosophy injects itself into the counsels of the Trinity and, along with Jonathan Edwards or the latest Biblebelters, announces *urbi et orbi* whatever it thinks things are, in order that things may be exactly as it thinks their cause should make them to be. Pseudo science ejects finality from its counsels, and finds itself either staring at the problem of origins with absolutely nothing to say, or saying that there are no origins. It is, from either point of view, a dirty trick on intelligence, and it is an old one. The Arabs tried it and, wrecking philosophy, would also have wrecked science itself. Scientists try it and, wrecking philosophy, are content to cling to the "uncertain certainties" of science.

Moses Maimonides and St. Thomas Aquinas caught them both at it.

"Both of these opinions," writes St. Thomas, "are without foundation. For the first (this is pseudo philosophy) excludes *proximate* causes in that it attributes all effects in inferior beings . . . to *their* causes alone; thus it derogates from the order of the universe whose texture is made up of order and the nexus of causes. The reason is: it is from the infinity of its goodness that the first cause confers on other things not only that they be but also that they be causes. The second opinion (this is pseudo philosophical science) has just about the same unacceptable issue: for . . . if inferior agents do nothing more than bring into the open what lay hidden within them, by removing the impediments which concealed the forms and habits of virtues and knowledges, it follows that all inferior agents act only accidentally."¹⁵

St. Thomas, patient man, thinks that merely mentioning the matter will suffice for reasonable men. Apparently it did not suffice. Men seem quite content to be unreasonable.

They like it less to appear ridiculous. And that is just what, in conclusion, they are. Scientists are ridiculous in maintaining that beings originated at a time when nobody was around to check: at a "then" or a "dawn." They are ridiculous in maintaining that something "struggled" because it struggled, that it "evolved" because it evolved, that it "progressed" because to progress is to progress. They are doubly ridiculous in capitalizing all these explanations: "Dawn, Struggle, Progress, Evolution, etc." Doubly ridiculous because they thus relapse into mythology.¹⁶ In sum, they are ridiculous in assuming that the question, why are there things, which is not susceptible for a scientific answer, is not susceptible of any answer at all. Philosophers are as ridiculous in assuming that the question, what are things, which is not susceptible of a philo-

¹⁵ *De Veritate*, XI, a. 1 I have underlined.

¹⁶ E. Gilson, *God and Philosophy*, pp. 135, 136: Better known as a zoologist, Julian Huxley must also be credited with having added the God struggle to the large family of the Olympians.

sophical answer, cannot be answered by science. Just as there is no *Deus ex machina* in science, so there is no

machina in philosophy or science or anywhere else, unless it be made by God.



Chief Advantages of a Liberal Education

... I argue that the political life of a country like ours would get depth and steadiness, would tend to escape its greatest danger, which is the disposition to take the immediate for the eternal, to press the advantage of present numbers to the full, to ignore dissenters and regard them as heretics, by some adumbration of what men have thought and felt in other times and at other places. This seems to me a surer resort than liberal weeklies, societies for the promotion of cultural relations, sermons upon tolerance, American Civil Liberty Unions. I know very well how remote from the possibilities of most men anything of the kind must be, but good temper, as well as bad, is contagious. And today in America vast concourses of youth are flocking to our colleges, eager for something, just what they do not know. It makes much difference what they get. They will be prone to demand something they can immediately use; the tendency is strong to give it to them; science, economics, business administration, law in its narrower sense. I submit that the shepherds should not first feed the flocks with these. I argue for the outlines of what used to go as a liberal education—not necessarily in the sense that young folks should waste

precious years in efforts, unsuccessful for some reason I cannot understand, to master ancient tongues; but I speak for an introduction into the thoughts and deeds of men who have lived before them, in other countries than their own, with other strifes and other needs. This I maintain, not in the interest of that general cultural background, which is so often a cloak for the superior person, the prig, the snob and the pedant. But I submit to you that in some such way alone can we meet and master the high-power salesman of political patent medicines. I come to you, not as an advocate of education for education's sake, but as one, who like you, I suppose, is troubled by the spirit of faction, by the catch-words with the explosive energy of faith behind them, by the unwillingness to live and let live with which we are plagued. It is well enough to put one's faith in education, but the kind makes a vast difference. The principles of a common pump are in my opinion not so important politically as Keats' *Ode on a Grecian Urn*, to crib a phrase from Augustine Birrell.—*The Spirit of Liberty*, papers and addresses of Learned Hand, collected, and with an introduction and notes, by Irving Dilliard. Alfred A. Knopf, New York, 1952.

SUGGESTIONS IN RESEARCH METHODOLOGY*

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On Saturday, October 20th of this year was held the first meeting of the Faculty of the Graduate School of the University of the Philippines to revise the Rules and Regulations for the degrees of Master of Arts and Master of Science. Almost a year ago before this meeting, the Graduate School of this University asked us to submit the names of the Faculty that will constitute its instructional staff. And only recently, barely three and a half weeks ago, we were informed that the higher degree or its equivalent is to be a prerequisite for permanent appointment on the faculty. All these show why I should be very much obliged to your Executive Committee for giving me the privilege of discussing with you this afternoon a subject on research which is very timely indeed. I have the opportunity of meeting the student members of the Alpha Chi Chapter of Phi Sigma Biological Society and their friends taking graduate courses in the biological sciences. Now that you are enrolled is a testimony of your desire to encourage in our university the aim of our society "to promote interest in research in the Biological Sciences." We should not be undivided on this very laudable objective of the University to further elevate the standard of higher education. The people of the Philippines and its government need it. More than ever in the past, the scientific societies undoubtedly should exert leadership in a new international intellectual reconstruction of the world.

There are often two methods by which we acquire knowledge—by argument and experiment. Argument allows us to draw a conclusion which

may cause us to admit that conclusion, but usually giving no proof as in an experiment. Doubts still linger every now and then. But here, a one and a half year old innocent child who has never known fire that burns and destroys, will not avoid it until he puts his finger into it and he knows it burns. Then he will always avoid it. This is a very simple science indeed, reflecting that many of our actualities in nature which everybody follows in life have been the results of continuous experimentations. Thru scientific methodology, we had been shown the effects to the world of the lasting contributions to humanity of Galileo, Leeuwenhoek, Darwin, Mendel, Pasteur, Agassiz, Madame Curie and the scientists of the atomic research.

The first of this methodology that I will suggest is the *Cultivation of Scientific Inquiry*. Remembering Professor Harley Harris Bartlett in his very elucidating talk to us delivered in the first scientific meeting of the society held July 18, 1947, he said: "bring biology at the door step." Among other things he suggested that mere collection of insects, or the pressing of leaves and flowers may be simple and yet demonstrative work of biology. When such intellectual curiosity develops, regardless of any circumstances to the contrary, the student begins to be inquisitive. He starts to realize how his beginning work becomes interesting and attractive, his friends and other members of the community around admire him. They come to see the assemblage of insects, leaves and flowers, which are otherwise rare to see or cannot be seen at all because they are out of season. As a mere collector of biological specimens and curiosities of nature, I be-

* Delivered at the Scientific Meeting of the Alpha Chi Chapter, December 19, 1951.

lieve that making collections is one of the many obligations we owe to our country. A collection stimulates the search for truth besides propagating natural beauty to casual visitors. In a moment representative specimens are revealed which will otherwise require several months of observations.

In a more enlightening example, Alexander Fleming's studies on penicillin resulted from his questioning mind. In 1928 he was working on cultures of a common disease producing bacteria in his laboratory. Accidentally a mold spore contaminated one of his hundreds of culture dishes. Upon growth of the mold the bacteria around it began to disappear. Secretion of the contaminating mold which we know today as antibiotics must have inhibited the growth of the disease forming organism. Many biologists would have discarded the contaminated culture, thus throwing away innocently the wonderful contaminant. Fleming recognized that the mold produced something which might be useful in the treatment of bacterial diseases. Presently the mold is known as *Penicillium notatum*, rosy in color, which has been the source of commercial penicillin since 1941.

Second in scientific methodology is the *Habit of Accumulating Writings of References*. Evidently a student should develop the act of making an outline or a summary of what he reads in the library or elsewhere, besides the prescribed texts. This is bound to widen and increase the vocabulary of expression which is sadly lacking in the great majority of students. There is noticeable nowadays which is one of the various problems of discussion in the last Golden Jubilee of the Establishment of the Philippine Educational System, the lack of powerful expression among our high school graduates. One of the major suggestions is the restoration of the seventh grade in the Elementary School. The other one is to frame a five-year curriculum in the high school to make up for one year lost in the elementary grades. But both of the plans might be reduced to mere gestures, on file or even off record. We must know that it will incur a great deal of additional expense for

our government which is now in the throes of deficit spending. It is in the colleges and universities that improvement must come, hence the methods in science should receive utmost attention. Otherwise as the *Manila Chronicle* editorialized last Sunday, the country is headed to produce more idiots based upon the experience of the last few years due to inadequacy of the period of elementary training given our children.

According to Dr. Pura Santillan Castrence, in her column in the *Manila Daily Bulletin* about a fortnight ago, the cause of all these handicaps must be supplemented by the lack of reading assignments in the high schools. Perhaps even the teachers themselves did not have much reading matter in their offices or in the homes. As teachers they should show examples to their students that they appropriate part of their time to reading. In fact they should allocate in the family budget a little amount to the procurement of reading matter. But how many can do this with the present shoe-string income given to our public school teachers? In one of their last sessions, librarians of the Philippines in convention said that our average allocation of five centavos per capita to the purchase of reading matter can hardly be compared with the sixty-five cents of the American. But in the university, if you know only how to go around, there are plenty of reading materials. After an examination of the offices of my colleagues in the Faculty, I am convinced that fairly sufficient reading matter pertaining to your subject are available. I also understand that our library, in spite of its limited personnel, is trying its best to give the maximum service to our faculty and students.

With special mention to the work of the graduate students, I believe that the particular interest should be determined by the time the graduate work begins. In many cases, however, it takes usually one semester to mature the choice of subject. Discussion of these problems with professors will greatly help. The first prerequisite of your thesis, once determined, is survey of literature. The faculty of your choice, otherwise your adviser, who

is to guide you in the work could tell readily the amount of available literature. Start doing it on a basis of knowing what had been done. It is in this instance where the suggestion of making and accumulation of outlines or synopsis will be of far-reaching significance. Some of these outlines may duplicate, but from experience, I am happy to tell you that they had enriched my vocabulary of expression. In the midst of your dissertation, you may need one of the outlines previously made which may help in casting away a doubtful observation. If by then you had not made your synopsis, shall that doubtful observation oblige you yet to go back to the reference? Yes you may, but it is always an unnecessary loss of time. The scientist should be in the habit of keeping notes of information directly or indirectly concerning his specialization.

I know of several friends who have had marked successes in their distinguished professions. Notes of many years ago, which had been made during their student days became useful reference in time of emergency. I am reminded of the time I got sick of malaria two years and eight months ago with two other members of my family in the Marine Biological Station of the University of the Philippines at Puerto Galera, Mindoro. This place, as many of you knew at that time, was almost completely isolated from civilization. After three days of illness, because there was no physician or available medicines, we decided to go to Manila for treatment. My father-in-law who was not a specialist in malaria administered the needed medicine and was able to send us back to the biological station to resume work after ten days. On recovery he showed me his old note on a method of curing malaria which he got from his Professor of Medicine almost three and a half decades ago. The fast aging physician used the old note to guide him before he gave us the treatment. This is a mere reminiscence of the past, but it saved us hundreds of pesos. Our memory usually fails us if we do not write down so much that we learn.

The third suggestion is *Desire to Develop Intellectual Honesty*. You should not entertain an inferiority com-

plex. Instead, be ready to admit errors when facts so indicate. It is very fundamental that overwhelming results of observations can disprove or support one's hypothesis to be regarded as a natural law. When results of the series of observations are to the contrary, learn to keep them also and appreciate their values, because later you may use them to redirect you in the revision of the mistaken procedures. It is not often easy today to lead a successful life without failures, tribulations, and difficult experimental stages. From experience you will be able to synthesize the expected result that you need in the making of a scientist out of yourself.

Various types of intellectual dishonesty are found in the thinking of most people. A student who makes a poor grade on an examination may blame the instructor, or anything else but himself. It reminds me of a student in the College of Agriculture at Laguna College who had an assignment in botany class to measure week by week the growth of a certain plant at the top of Mt. Makiling. This should mean, of course, sixteen weeks during the semester. To ascend to the top of the mountain was a drudgery. The student, however, followed the instruction for the first five weeks and with his satisfactory data, made a beautiful perfect mathematical calculation of growth for the rest of the semester. He submitted the work as a requirement to pass the botany class. What do you think of this intellectual dishonesty? The instructor himself found that the total growth of the plant registered conspicuously very much beyond the tallest plant ever recorded of that species. The student besides getting a grade of "5" was suspended from the college. Intellectual dishonesty does not do any good to any body. If dishonesty flourishes without the notice of authorities and given the chance to mature in the student the graduates of this university are bound to lose value to the nation. The aim of our society should remain inviolate to the desire of developing honesty in the sciences and humanities.

The fourth of the suggestions that I desire to tell you is the *Development*

of *Open-Mindedness*. Never be biased and intolerant. Accept criticism, especially when enlightening to the problem being studied. One great characteristic which makes our present Secretary, Dr. Juan S. Salcedo, Jr., perhaps the best Secretary of Health we have had is his maturely developed tolerance. He has always a very high regard for the opinion of others. For many times I have been informed that he has involved himself in many debatable problems of health in the Philippines. He has gained the admiration of his colleagues, and his critics have learned to admire him because he can settle such problems amicably. He is cool, suitably tempered, and talks freely even with those whose requests he knows he has not approved.

Open-mindedness is an asset of the scientist. Regard the right of others to enjoy a discussion; this always makes your work easier and more fact finding. To the others the critics are sources of inspiration to work harder and get ever ready for similar criticisms. When you work in the laboratory or seat on your thesis, consider every day an examination day with your major professor or with a friend who comes along and assesses your activity. Who of you does not like to be praised in one's work? Now your critics, who may be your very friends may surprisingly puff up and say, "you are working too hard, give yourself some recreation time, and so forth and so on." Remember again, open-minded fellows in science are those that I want you to emulate. "Science flourishes and scientists made progress in an atmosphere of free inquiry and free interchange of ideas." Can you be one of them?

The fifth and last of the suggestions that I have this afternoon is the *Cultivation of Friends in Research*. There are two distinguishing relations that I would like to tell you, namely,—first, your relation with the major professor or your thesis adviser, and second, your relation with your classmates.

There should be a certain amount of exchange of ideas or discussion between the adviser and the student. This will depend upon the nature of research, the speed by which it

can give sufficient results for discussion. The student embarked in the work on his thesis as I have just stated above, is surveying the available literature. Even before this inquiry, he or she already has made up her mind as a junior partner in this particular research (thesis) with the professor. He is assigned a working table, a microscope perhaps, or some other equipment which he should keep clean and neat. I do not think it is misappropriation of time if he takes five minutes or so every morning to clean up the table and the rest of the assignment. The condition of his premises usually indicates how clearly his mind works. Careless laying down of the equipment used might be interpreted to indicate carelessness in the student. Besides the outline to be followed in the thesis, you are at liberty to substantiate the work with your own plan. You work willingly and diligently so as to quickly familiarize yourself with the problem until finally you develop mastery of the subject matter. Sometimes because of your painstaking effort you might even bring to the attention of your adviser an obscure paper or one of the latest reprints related to the thesis which he has not read.

In a seminar or a Biological Society meeting it might be very logical that you present a preliminary report of the dissertation before the final write-up of the thesis is submitted. Incidentally I should add that you should not be afraid or entertain embarrassment to discuss it in the seminar or meeting. Remember that you are entitled to your opinion and freedom of discussion. It might be highly suggestive at this juncture that your attendance to similar programs will help in one's personal equipment to maintain courage when your own chance comes. In American universities, the graduate student will spend his last cent and travel even miles just to go to a scientific meeting and participate in the discussion.

In the relation with the classmates or with those doing cognate research, may I present my own experience when I was about to start cultures of materials for my thesis. I had a friend, Ralph Bennet, who had made similar cultures of organisms of his

studies of the lower fungi. He discussed with me the precision that he finally followed in the preparation of his culture media after failing in the beginning. When I had to make my own, I had to make several alternating dilutions, besides the formulae of at least two well known physiological solutions on the cultures of algae. He used to visit me in my laboratory as I visited him in his mycological laboratory. We called each other fellows in research. A very significant effect of such an association was that both of us became acquainted with each others research, hence one is not limited in developing his own ideas. Our University needs more friends in research. The availability of graduate students to my mind will accelerate such friends in the university. In fact, the Research Center of this University has classified the graduate students as a group to be one of the resources of research productivity of the institution. Presently our enrollment in the Graduate School total two hundred and thirty-nine. One hundred and fifty-three of these are enrolled in Diliman, Quezon City and eighty-six at the Extension Division in Manila, which makes the role obvious of this energetic batch of students in the progress of the institution. A professor doing a limited amount of research due to his teaching load encounters many new ideas which he would like to follow in the

greater detail. The availability of graduate students gives the professor an opportunity to carry out his work. The professor profited, the student gained greatly from the close association with him and the university gained in research prestige.

I have now emphasized at least five suggestions in Research Methodology, namely: (1) *Cultivation of Scientific Inquiry*; (2) *Habit of Accumulating Writings of References*; (3) *Desire to Develop Intellectual Honesty*; (4) *Development of Open-Mindedness*; and (5) *Cultivation of Friends in Research*. There may be needed less or more than the foregoing suggestions, which will depend upon proficiency and ability of the students pursuing higher education. But I am directing the suggestions, I know, to a greater population. In the University of the Philippines, I repeat, there are now embarked in higher education two hundred and thirty-nine ambitious young men and women desirous to help the nation thru more technical and specialized training. It is not out of place here to prophesy that in five years from now, even the Private Colleges and Universities will make the Master of Arts or the Master of Science degree a requirement for their faculties. By that time, if I may continue my prophecy, this University of ours will be able to offer the degree of Doctor of Philosophy in still higher specialization. I thank you.



A Great Time to Graduate

Too many things in the world are desperately wrong. But don't let this discourage you. Never was there a time in the world's history when everything was right. Despite the warnings of today's commencement speakers and baccalaureate preachers, there have been times when things were worse—far worse. But times of crisis like these demand intelligent leadership of a high order. Never, I believe, was there greater opportunity for college graduates who are soundly prepared for

responsible places in business, in industry and in the learned professions, for public office and for leadership in world affairs. These are indeed dangerous times, but the greater the danger the greater the challenge, and the greater the call for young people prepared to dedicate their lives to the service of human society. This is a good time—a great time—to be graduating from college.—President Carl R. Woodward, University of Rhode Island.

NEW BOOKS

This section offers brief, mostly uncritical reports on the general content of recent publications in biological and related fields. Only the longer critical reviews will be signed. For quick location on library shelves, each notice will be preceded, wherever possible, by three groups of numbers, the first two of which will be the Devey and the Library of Congress classified numbers respectively. The third group is the L.C. card number, for the convenience of Librarians.

ADVANCED STATISTICAL METHODS IN BIOMETRIC RESEARCH, by C. RADHAKRISHNA RAO; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; 1952, 390 pp., tables. \$7.50.

591.9 311.2 QA276.R3 52-5325

The author had his Ph.D. from Cambridge in 1948 where he was research assistant in the Anthropological Museum. The nine chapters deal respectively with algebra of vectors and matrices, theory of distributions, theory of linear estimation and tests of hypotheses, the general theory of estimation and the method of maximum likelihood, large sample tests of hypotheses with application to problems of estimation, tests of homogeneity of variances and correlations, tests of significant in multivariate analysis, statistical inference applied to classificatory problems, and the concept of distance and the problem of group constellations.

ADVANCES IN ENZYMOLOGY, Vol. 13, edited by F. F. NORD; Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y.; 1952, 413 pp., tables, illus. and fig. \$8.50.

612.0151 QP601.A1A3 41-9213

There are nine chapters by twelve authors dealing with localization of enzymes in cytoplasm; some aspects of tracers in permeability; "adaptation enzymatique;" genetic formulation of gene structure and action; adenosine triphosphate and structural proteins in muscle contraction; hyaluronidases; aspects of intermediary metabolism of glutamine, asparagine and glutathione; stoichiometric inhibition of

chymotrypsine; the comparative biochemistry of nitrogen fixation.

AIDS TO ZOOLOGY, by HARRY LISTER; Williams and Wilkins Co., Baltimore 2, Md.; 1952, 279 pp., tables and 69 fig. \$2.00.

590.2

This revised fourth version of the original 1929 edition is up to date. It is one of the British series of "how to study" books, the overseas counterpart of our American "College Outline Series." Just as good, and just as cheap.

THE AMAZING AMAZON, by WILLARD PRICE; The John Day Co., Inc., 210 Madison Ave., New York, N. Y.; 1952, 306 pp. and maps. \$4.00.

918.1 F2546.P877 52-9613

Amazing is the right word. Nothing more unbelievably Ripleyesque has appeared in the past few years. Must be read to be appreciated.

AUDUBON'S BUTTERFLIES, MOTHS, AND OTHER STUDIES, by ALICE FORD; Studio-Crowell Publications, 432 Fourth Ave., New York 16, N. Y.; 1952, 120 pp., illus. in color. \$5.75.

591.973 QL151.F65 52-10374

A slim book, beautifully illustrated, carefully edited from original sources, with much hitherto unknown information about the real Audubon who was interested in insects and reptiles as well as birds.

BACTERIA, by K. A. BISSET; The Williams & Wilkins Co., Baltimore 2, Md., 1952, 123 pp., 38 fig. \$4.00.

589.9

The author, who is a member of the Department of Bacteriology in the University of Birmingham, is very explicit in his assertion that this is a natural history of bacteria,—not a textbook. This permits the author to take his hair down and wade into his subject without fear or favor,—as for example: "The classification of bacteria has for long been in a very unsatisfactory state. The system employed in the United States and many other countries embodies a needlessly complex and highly artificial grouping, and a nomenclature which, by a rigid and entirely uncritical adherence to the principle of priority, has substituted ugly and inappropriate names for better ones in common use."

BACTERIA, by STANLEY THOMAS & THOMAS GRAINGER; The Blakiston Co., Philadelphia 5, Pa.; New York 22, N. Y.; Toronto 2, Canada. 1952. 623 pp., 175 illus. \$5.50.

589.95 QR41.T497 52-2271

This is a biologist's bacteriology, which aims to cover fundamental concepts for all kinds of students, not only premedics or prenursing specialists. The co-authors are mainstays in the department at Lehigh University. Their book covers the usual preliminary details with some emphatic reviewing of biological principles, and the physicochemical aspects of their subject. Then they take up bacterial cytology, chemistry, and the bacterial enzymes, metabolism, nutrition, respiration and ecology. There are single chapters devoted to the bacteria of the soil, sea, water, sewage, air, foods, dairy products, industry and the pathogens. The book looks interesting.

BASIC PSYCHIATRY, by EDWARD A. STRECKER. Random House, New York, N. Y. 1952. 473 pp. \$3.75.

616.8 RC—54.58 52-5553

Dr. Strecker has held so many and such high positions in the medical, psychiatric and psychosomatic fields that this book needs no critique or recommendation. It deals with the sort of thing that every student should want to know something about, both for his own good and for the good of the society in which he happens to be placed. It is not too technically written.

BEAUTIFY YOUR HOME GROUNDS, by PETER RHODES. Homecrafts Publishers, 1952. 90 pp., illus. \$1.50.

52-11136

This thin volume has much to offer the horticulturally inclined. The charts, diagrams and working drawings are so clear that it would not require a professional landscaper to make a discouraging plot of ground a satisfying home site. New home builders or purchasers should get a lot out of it.

BIOCHEMICAL PREPARATIONS, edited by E. G. BALL. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 109 pp. \$3.00.

612.01572 QP509.B5 49-8306

Twenty-three preparations are detailed. Each has been checked by up to three research workers in this country's largest universities.

BIOLOGICAL ANTAGONISM, by GUSTAV J. MARTIN. The Blakiston Co., Philadelphia 5, Pa.; New York 22, N. Y.; Toronto 2, Canada. 1951. 516 pp., 64 fig., 44 tables. \$8.50.

612.015 QH331.M32 51-8565

Presents the theory of biological relativity, the "general law" underlying all biological activity and fundamental to the solution of biological problems. Covers antagonism of amino acids, purines, pyrimidines, vitamins, hormones and minerals, especially as the basis of immunology, pharmacology and chemotherapy.

BIOLOGICAL CHEMISTRY, by ALEXANDER GERO. The Blakiston Co., Philadelphia 5, Pa.; New York 22, N. Y.; Toronto 2, Canada. 1952. 340 pp.

547 QD415.G44 52-4718

This is biochemistry from the chemist's angle. Hence, the text is to all intents and purposes what the author calls an advanced organic chemistry with accent on physiological material.

BIOLOGY, ITS HUMAN IMPLICATIONS, by GARRET HARDEN. W. H. Freeman & Co., San Francisco, Calif. 1952. 720 pp. \$5.00.

574 QH308.H25 52-4036

This tries to answer the question: "What should a student learn in a college course in biology, if he will

never again be exposed to formal instruction in the subject?" The five parts into which it is divided include: an introduction, the measure of man, heredity, evolution, and the living world, the web of life.

THE BIOLOGY OF PARAMECIUM, by RALPH WICHTERMAN. The Blakiston Co., Inc., Philadelphia 5, Pa.; New York 22, N. Y.; Toronto 5, Canada. 1953. 527 pp., 141 illus. \$9.00.
593.17

The protozoology section of all college libraries has been enriched by this monograph on one of the omnipresent and much used unicellular animal forms. The chapters break up as follows: History of the genus; classification and species; morphology and cytology; ecology; physical and chemical properties; nutrition, secretion and growth; respiration, excretion and contractile vacuoles; movement and motor response; reproduction and sexuality; mating reaction; types, breeding relations, etc.; vitality studies; serological studies; organisms living in or upon it; research techniques; utility of paramecium in biological research. There are 72 pages of bibliography, approximately two thousand references.

THE BIOLOGY OF PHOSPHORUS, edited by L. F. WOLTERINK. Michigan State College Press, East Lansing, Mich. 1952. 147 pp., fig. \$2.00.
574.19 QP535.P1W8 52-11637

In five chapters by as many authors, the implications of phosphorus is set forth. The first chapter by G. Evelyn Hutchinson deals with the biochemistry of phosphorus. Harry G. Albaum discusses the role of the chemical in plant metabolism and the incorporation of radiophosphorus in growth. Harold C. Hodge handles the role of the skeleton as shown by radioisotopes. Jacob Sacks sets forth the significance of the Phosphorylation Cycle in intermediary metabolism. The final chapter treats of the role of phosphate in metabolic control of mechanisms.

BOTANY, by CARL L. WILSON. The Dryden Press, 31 West 54th St., New York 19, N. Y. 1952. 483 pp., 306 illus., 347 fig. \$6.10.
580 QK47.W726 52-9413

This is the most unusually illus-

trated textbook for general botany that has appeared in years. It is not merely the fact that the illustrations are so profuse, it is the fact that they are so fresh. The photographs are excellent but the drawings, sketches and diagrams from Hannah Croasdale's inspired pen set a new high for all future texts to equal. The text matter is as modern as isotopes, apparently up to the standard of the illustrative material. There is also a fourteen-page glossary.

CARBOHYDRATE METABOLISM, edited by VICTOR A. NAJJAR. The Johns Hopkins Press, Baltimore 18, Md. 1952. 134 pp., \$4.00.

616.46 612.0153 QP701.N3 52-13390

Ten papers presented at a symposium sponsored by the M&R Laboratories, Columbus, Ohio, cover enzymatic synthesis of glycogen, muscle and liver phosphorylase, pituitary inhibition, metabolism of glucose and pyruvate, spontaneous hypoglycemia, etc.

CHEMICAL CONTROL OF INSECTS, by T. F. WEST, J. ELIOT HARDY & J. H. FORD. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1953. 211 pp., 16 tables, 43 fig. \$3.25.

632.9

This is a compact little volume by three outstanding British specialists in the field. Each of the sixteen chapters is well authenticated by bibliographic citations, many of them from American publications.

CHEMISTRY AND PHYSIOLOGY OF THE NUCLEUS, edited by V. T. BOWEN. Academic Press, Inc., 125 East 23rd St., New York 10, N. Y. 1952, 402 pp., tables. \$7.00.

574.8

This is the second supplement to the original 1948 Brookhaven National Laboratory's biological conference report. There are 21 papers all converging on nuclear structure and function.

COLLOID SCIENCE, Vol. I, edited by H. R. KRUYT. Elsevier Press, Inc., 300 Park Ave., New York, N. Y. 1952, 389 pp., text fig. \$11.50.

541.3452 QD549.K9473 51-7665

This is the first volume of a series, the second of which, on reversible sys-

tems, appeared in 1949. The present production is devoted to the irreversible or "lyophobic" colloid systems, as opposed to the reversible or "lyophilic" systems. In this the author has the assistance of G. H. Jonker of the Philip's Research Laboratories who contributes the article on optical properties of colloidal systems. The editor handles the general introduction, leaving the other sections to J. Th. G. Overbeek, Professor of Physical Chemistry, Utrecht University. Dr. Overbeek contributes chapters on phenomenology of lyophobic systems, electrochemistry of the double layer, electrokinetic phenomena, the interaction between colloidal particles, kinetics of flocculation, stability in hydrophobic colloids and emulsions and the rheology of lyophobic systems.

COMPARATIVE EMBRYOLOGY OF THE VERTEBRATES, by OLIN E. NELSEN. The Blakiston Company, Inc., 575 Madison Ave., New York 22, N. Y. 1953. 982 pp., 380 figs., 3 tables. \$8.00.

591.33

This book aims to present the later as well as the earlier stages of the embryology of the representative vertebrate species. It therefore forms a more coherent connection with comparative vertebrate anatomy. The book is replete with illustrations, most of them new to text book literature. Each chapter ends with a rich list of pertinent references for reading or consultation.

CONTRIBUTION TO THE THEORY OF THE LIVING ORGANISM, by W. E. AGAR. Cambridge University Press, 32 East 57th St., New York 22, N. Y. 1952. 235 pp. \$3.75.

577.21 QH331.A32 44-9082

This book by the eminent late Professor of Zoology in the University of Melbourne originally appeared in the thick of World War II. Consequently, few copies reached the United States. Those that did received such encouraging reception that both author and publisher were impelled to prepare this revised edition. Whether you agree with him or not, you will be forced to admire the author's lucid thinking and his courage. As *Nature* said of the original edition: "If bi-

ologists admit that they should give heed to the trend of thought in Whitehead's philosophy of organism, as sooner or later it seems they must, then they would do well to read this book."

CYBERNETICS, edited by HEINZ VON FOERSTER. Josiah Macy, Jr. Foundation, 565 Park Ave., New York 21, N. Y. 1952. 240 pp. \$4.00.

506

This is the third volume in a series dealing with circular causal and feedback mechanisms in biological and social systems,—which is the definition of cybernetics and the subtitle of the book. This session reports the discussions centered around the problems of communication. As such, the topics range through problem solving, language and its meaning, sanity and insanity, animal intercommunication, the search for basic symbols, etc.

DECORATING WITH HOUSE PLANTS, by RUTH GANNON. The Studio-Crowell Press, 432 Fourth Ave., New York 16, N. Y. 1952. 136 pp., 54 illus., 7 fig. \$5.00.

635.9652 SB419.G35 52-452

In these days of redoubled interest in gracious living, when television puts more accent on the home, than on outside attractions, it is perhaps inevitable that the variety and color of plants should find place in home decoration. This is a book that can be safely recommended as being scientifically correct without being stuffy, as being interesting without being familiar.

DEFORMATION AND FLOW IN BIOLOGICAL SYSTEMS, edited by A. FREY-WYSSLING. Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. 1952. 552 pp. \$11.50.

574.1082 QH505.F7' 52-4631

The phenomena of rheology,—from their plant, their animal and their human implications—get the attention of Drs. William Seifriz of the University of Pennsylvania, M. G. M. Pryor of Trinity College, Cambridge, and the Editor, on cells in general. Translocation of solutes in plants is handled by R. D. Preston of the University of Leeds, and J. J. Hermans of the University of Groningen. Translocation in animals and man is authored by

Dr. L. E. Bayliss of University College, London, Marc Amsler and Alfred Huber of the University of Zurich, G. W. Scott Blair of the University of Reading, and P. Eggleton of the University, Edinburgh.

DESIGN FOR A BRAIN, by W. ROSS ASHBY. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 260 pp., text fig. and tables. \$6.00.

612.82 QP376.A8 52-13230

This is the first book presenting the author's results systematically in the field of brain function research. Its author is Director of Research at the Psychiatric Hospital, "Barnwood House," Gloucester, England. The last 50 pages are devoted to an appendix giving the mathematic evidences for his fundamental concepts. The main part of the work deals with the intelligence of the brain as a mechanism. The author's main contention is his solution,—the principle of ultra-stability.

DISEASES OF VEGETABLE CROPS, by JOHN CHARLES WALKER. The McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 32, N. Y. 1952. 529 pp., 116 fig. \$7.50.

635 SB732.W3 51-12826
Agr 52-409

Dr. Walker's position on the staff of the University of Wisconsin, his previous well-accepted "Plant Pathology" published by McGraw-Hill in 1950, make this volume, which was originally prepared for the author's graduate students, equally acceptable. The preceding volume covered the general theories and types of plant infections and their control. This volume specializes in the diseases of each of the following groups: asparagus, beans, beets, chard, carrots and parsnips, celery and parsley, crucifers, cucurbets, lettuce, endive, escarole, chicory, salsify, globe artichoke, onion garlic, leek, chive and shallot, peas, peppers and eggplants, potatoes, rhubarb, spinach, sweet potatoes and tomatoes. Each form of infection on each type of plant has its own bibliography.

ELECTRON STRUCTURES OF ORGANIC MOLECULES, by LLOYD N. FERGUSON. Prentice-Hall, Inc., 70

Fifth Ave., New York 11, N. Y. 1952. 335 pp., tables, graphs, structural formulae. \$8.65.

541.22 QD476.F4 52-12248

This book is an attempt to assemble most of the widely accepted modern concepts of the electron distribution of organic molecules and to present a general description of the more direct methods through which these view points have been formed. It is largely a qualitative treatment to serve as an introduction to this phase of physical organic chemistry.

EVOLUTION IN THE GENUS DROSOPHILA, by J. T. PATTERSON and W. S. STONE. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1952. 610 pp., 109 tables, 74 fig. \$8.50.

595.772 QL537.M6P3 52-4682

This volume is an attempt to give pertinent details of evolution as it has been revealed in the investigations of one of the most successful insect genera, the genus *Drosophila*. The author's hope it presents a full analysis and synthesis of the many types of information on *Drosophila* which have been accumulated in the past century.

FERN GENUS DIELLIS, by WARREN H. WAGNER, JR. University of California Press, Berkeley 4, Calif. 1951. 212 pp., 21 pl., 31 text fig. \$3.00.

587 QK1.C2 Vol. 26 A52-9552

This monograph deals with the structure, affinities and taxonomy of an endemic Hawaiian genus of ferns. It is the first paper of volume 26 in the University of California publications in Botany.

FERNS OF MICHIGAN, by CECIL BILLINGTON. Cranbrook Institute of Science, Bloomfield Hills, Mich. 1952. 248 pp., 81 drawings, 17 pl. \$5.00.

587 QK525.5M5B55 52-12080

This is the last of Cecil Billington's works. Its gifted author died 17 March 1950 with the work in all but its final but most exhausting stages. It was completed under the meticulously accurate supervision of Dr. Stanley A. Cain. As usual with all Cranbrook publications, the format is attractive beyond criticism.

FIELD GUIDE TO SHELLS, by PERCY A. MORRIS. Houghton Mifflin Co., 2 Park St., Boston, Mass. 1952, 220 pp., 40 plates, 6 in color. \$3.76.

594 QL417.M72 52-8276

Another in the Peterson Field Guide Series,—this one is devoted to the shells of the Pacific Coast and Hawaii. The author is on the staff of the Peabody Museum of Natural History, Yale University.

FORESTRY AND ITS CAREER OPPORTUNITIES, by HAROLD L. SHIRLEY. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. 1952. 492 pp., 118 illus. \$6.50.

634.9 SD371.S5 52-6001

The Dean and Professor of Forestry at the State University of New York's College of Forestry at Syracuse University presents prospective forestry career students with an over-all picture of the opportunities before them. More than this, the volume is filled with other information devoted to the social benefits of forestry, the business of forestry, forest employment by regions and fields, employing agencies, recreational use of the forest, and management of park lands.

FLOWERS OF THE SOUTHWEST MOUNTAINS, by LESLIE P. ARNBERGER. Southwestern Monuments Assn., Box 2011-U, Santa Fe, New Mexico. 112 pp. \$1.00.

This is a beautifully clear collection of drawings with descriptions of some 152 local plants, particularly of New Mexico and Arizona.

FLORISTIC RELATIONSHIPS BETWEEN EASTERN ASIA AND EASTERN NORTH AMERICA, by HUI-LIN LI. American Philosophical Society, Independence Sq., Philadelphia 6, Pa. 1952. 58 pp., 56 maps. \$1.00.

581.9 Q11.P6 52-13594

This paper corroborates Asa Gray's 1840 review of Seibold's *Flora Japonica*, in which he pointed out the singular parity in the American and Asiatic distribution of many similar plant forms, varieties or species. As a study in plant geography, it is of considerable ecological interest.

FOUNDATIONS OF BIOLOGY, S. B. MOMENT and H. N. CROUSE. Appleton-

Century-Crofts, Inc., 35 West 32nd St., New York 1, N. Y. 1953. 282 pp., 61 fig. \$2.50.

Forty units of work and forty sets of detachable work sheets punched for a three-ring binder, the whole designed to accompany and complement the senior author's textbook.

FRESHWATER FISHERY BIOLOGY, by KARL P. LAGLER. Wm. C. Brown Co., 915 Main St., Dubuque, Iowa. 1952. 360 pp., 184 fig. 5 appendices. \$5.75.

597

Just what fishery research people do with their time, the problems they have to solve, and the way they solve them, are only a small part of the remarkable compass of this new book by the Chairman of the Department of Fisheries in the University of Michigan's School of Natural Resources. The beginning of the book is devoted to the more elementary ideas of fish biology, embryology, ecology, taxonomy, pathology, etc. Then follows the practical application in the chapters on pollution, culture, surveys, improvement of fishing waters, commercial and sport fishing. There is one appendix devoted to types of freshwater fish scales, another with samples of records kept in fishery research, a third of abbreviations, a fourth with diagnostics of fish (especially trout) diseases, and the final one of handy conversion tables.

FUNCTIONAL ANATOMY OF THE ANIMAL, by W. JAMES LEACH. The McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 1952. 276 pp., text fig. \$4.50.

611.072 QL739.L4 51-13591

This condensed text covers all the essentials of mammalian anatomy through the various organ systems including the endocrines. This second edition has been improved in its presentation of the larynx, kidney, and special sense organs and their connection with neural pathways. New material has been added on the integument and its derivatives.

HARDY PLANTS, Vol. 3, GARDENS AND GARDENING, edited by F. A. MERCIEN & ROY HAY. Studio-Crowell Publications, 432 Fourth Ave., New

York 16, N. Y. 1952. 142 pp., 155 illus. \$5.00.

635.9058 SB403.648 32-26518

Like its two predecessors, this third volume in the *Gardens and Gardening Series* is lush in lovely photography. There are chapters on gardens to enjoy, tall bearded irises, delphiniums, adaptability of hardy flowers, peonies, herbaceous edging, carnations and pinks, michaelmas daisies, the herbaceous border and hardy ferns. In addition, there are charts and lists to suit the taste or stimulate the interest of possessors of the green thumb anywhere.

GENERAL GENETICS, by ADRIAN M. SRB and RAY D. OWEN. W. H. Freeman and Co., San Francisco, Calif. 1952. 571 pp., 182 illus., 3 color, 62 tables. \$5.50.

575.1 QH431.S69 52-10964

Cornell University and the California Institute of Technology are represented in the authorship of this new college text in genetics. The first 16 chapters follow the more or less classical pattern in genetics teaching. The next three deal with more recent developments. The following two are devoted to population problems and evolution. The last three deal with practical applications in plant production, animal productivity and human welfare.

GENERAL PSYCHOLOGY, by ROBERT E. BRENNAN. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1952. 524 pp., 27 fig. \$5.50.

150 BF131.B76 52-4208

Anyone who wants to discover the kind of general (not rational) psychology taught in the Thomistic schools will find this volume typical. It is not that the author goes out of his way to integrate Thomas Aquinas into modern thinking. The surprising thing is that was so modern for his time.

A GENERAL ZOOLOGY OF THE INVERTEBRATES, by G. S. CARTER. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1952. 509 pp., 172 fig. \$5.75.

592 QL362.C37 41-6636

Julian S. Huxley introduces this volume with a remark to the effect that it is one of the few attempts thus far made to weld together systematic zoology and general biological principles. He further remarks that it is a difficult task but vital for the new biological synthesis which is in the offing. The author admits that this is not a textbook. He assumes that those who use it have already studied the Invertebrata. He approaches his subject from the organismal point of view, and this requires a knowledge of comparative physiology and other branches of zoology in the student.

THE GENUS CODIUM IN CALIFORNIA, by PAUL C. SILVA. University of California Press, Berkeley 4, Calif. 1951. 35 pp., 32 fig. \$50. 589.4723 QK569.C65S54 A51-9373

This is a much-needed monograph to bring our knowledge of marine algae up to date. The author describes one new species from Santa Cruz Island, and deep waters of Redondo Beach, California.

GUIDE TO FREE SLIDE FILMS, edited by MARY F. HORKHEIMER & JOHN W. DIFFOR. Educator's Progress Service, Randolph, Wis. 1952. 172 pp. \$4.00.

Just for the sake of getting free illustrative material, this handbook is cheap at many times its price. Many new features have been added to make this even a better reference for the instructor, particularly at the high school level.

GUIDE TO HISTORY OF SCIENCE, by GEORGE SARTON. Chronica Botanica Co., Waltham, Mass. 1952. 316 pp. \$7.50.

509 Q125.S24 52-10902

The history of the sciences is coming into its own. More and more the various schools of science are encouraging the offering of courses in the origin and development of their particular fields. This book is designed to serve both the scientists and scholars as well as the historians of science. The first part consists of three lectures on the implications of science history; the second and larger part is a most useful compendium of bibliographies on science history.

HAMMOND'S NATURE ATLAS OF AMERICA, by E. L. JORDAN. C. S. Hammond & Co., Maplewood, N. J. 1952. 256 pp., 320 col. plates, 104 col. maps. \$10.00.

574.973 QH102.J6 Map 52-904

Any college library without this book is missing something. It contains 320 original colored paintings of rocks, trees, wildflowers, birds, animals, reptiles, fishes and insects, as well as range maps indicating their distribution. There are also large-scale colored maps indicating highways, parks, refuges and game preserves. There are also maps to cover relief, vegetation, temperature and rainfall. A glossary and indices complete a much needed reference work for biogeography.

HANDBOOK OF TROPICAL DERMATOLOGY AND MEDICAL MYCOLOGY, edited by R. D. G. PH. SIMONS. Elsevir Publishing Co., 300 Park Ave., New York, N. Y. 1952. 845 pp., 587 fig. \$15.00.

616.5

52-5660

An international team of over eighty specialists from twenty different countries here present the first volume of a monumental undertaking. Fifty additional dermatologists will help to complete the series. This first volume consists of thirty-two articles on dermatology in general, protozoan diseases, bacterial and cocci diseases, those due to rickettsiae and viruses. It closes with two papers on miliarial dermatoses and tropical acne. The book was conceived and began in a Pacific P.O.W. camp during World War II, and the earlier contributors were from among the professional among the prisoners. Since the war it has been expanded to its present size.

HANDBOOK OF TURTLES, by ARCHIE CARR. Comstock Publishing Associates, 124 Roberts Place, Ithaca, N. Y. 1952. 542 pp., 82 plates, 37 fig. \$7.50.

598.13

QL666.C5C34

52-9126

After a morphological introduction of forty-six pages, the main part of the book is devoted to accounts of the 79 species and sub-species of turtles of the United States, Canada and Lower California. The book is well illus-

trated, some of the plates being of exceptional interest, notably the first pictures ever taken of a dermochelys in the laying process. There is a very complete bibliography of 68 pages.

HISTORICAL GEOLOGY, by KIRTLEY F. MATHER and CHALMER J. ROY. Appleton-Century-Crofts, Inc., 35 West 32nd St., New York 1, N. Y. 1952. 96 pp., 24 plates. \$2.75.

551.7

This is the second part of the "Introduction to Geology" laboratory manuals, the first of which appeared in 1934. Since the historical phase of geology is always of more interest to biologists by reason of its paleontological connections, it may be that the interesting maps, particularly of the glaciations and the illustrations of fossils, will be of interest to our readers.

INFIRMITIES OF GENIUS, by DR. W. R. BETT. Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y. 1952. 192 pp., 6 illus. \$4.75.

52-13326

This unusual work is a medical man's study of the mental and/or physical disabilities of fifteen undoubted geniuses of more or less recent times. Among them are Carlyle, Shelley, Smart, Whitman, Swinburne, Poe, Lamb, de Quincey, Baudelaire, Balzac, Keats, Burns, Byron, Pope and Hearn. The author's conclusion is that in every case infirmity has a perceptible effect upon the shaping of thought and the developing of genius.

INTRODUCTORY MYCOLOGY, by CONSTANTINE J. ALEXOPOULOS. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 482 pp., 187 fig. \$7.00.

589.2

QK603.A55

52-8641

Written in answer to the question: What are the fungi and how do they affect us? It is not a treatise for specialists. It was intended for students who know next to nothing about fungi. It is not, therefore, complete, nor is it a reference work. It is an introduction to mycology for future mycologists.

INVERTEBRATE FOSSILS, by RAYMOND C. MOORE, CECIL G. LALICKER, and ALFRED G. FISCHER. McGraw-Hill Book Co., 330 West 42nd

St., New York 36, N. Y. 1952. 766 pp., 400 fig. \$12.00.

562 QE770.M6 51-12632

This work was designed for beginners in invertebrate palaeontology, especially those without preliminary courses in zoology. It is solidly arranged on the basis of morphology, and covers the foraminifera, sponges, coelenterates, bryozoans, brachiopods, mollusks, gastropods, cephalopods, pelecypods, annelids, arthropods, trilobites, astracods, chelicerates, myriapods, insects, echinoderms, crinoids, holothuriids, starfishes, echinoids, graptolites and conodonts.

IN YARDS AND GARDENS, by MARGARET WARING BUCK. Abingdon-Cokesbury Press, Nashville, Tenn. 1952. 72 pp. \$3.00.

574.973 QH81.B858 52-8350

A profusely illustrated book for youngsters or nontechnically trained oldsters with a "yen" to know more about the animals which come close to human habitations. It is refreshingly well done without "talking down" or building up pretended enthusiasms. All good nature study at the sub-high school levels.

JOURNAL OF RESEARCHES, by CHARLES DARWIN. Hafner Pub. Co., 31 East 10th St., New York 3, N. Y. 1952. 615 pp. 17 pl. 1952. \$7.50.

574

This is one of the Pallas Collection of offset reprints of out-of-print and classic scientific works. As such, this is a facsimile of the extremely rare original 1839 volume. If students could be introduced to Darwin by this attractive volume instead of his more formidably scientific works, the chances are that they would take to him more readily.

LABORATORY MANUAL FOR ELEMENTARY PHYSIOLOGY, by LALLA V. WALLING. The C. V. Mosby Co., 3207 Washington Ave., St. Louis 3, Mo. 1952. 257 pp. \$3.50.

This is the fifth edition of this very practical laboratory manual. Printed on detachable five-hole punched sheets, there are no work sheets at the back of the book. Each unit is complete with all questions, suggestions and directions integrated into the exercise.

LABORATORY TECHNIQUE IN BIOLOGY AND MEDICINE, by E. V. COWDRY. The Williams and Wilkins Co., Baltimore 2, Md. 1952. 382 pp., \$4.00

578.9 QH207.C65 52-3519

This manual has been previously and favorably noted in these pages. The fact that this third edition follows hard on the heels of the second (1948) speaks for itself. Much new material and some unusual techniques are included. It is a "must" in every histotechnique or physiology laboratory.

MAN AGAINST CANCER, by I. BERENBLUM. Johns Hopkins Press, Homewood, Baltimore 18, Md. 1952. 182 pp. \$3.00.

616.994 RC267.B45 52-13023

This is the layman's book about cancer and cancer research. It does not indulge in any over-technical phraseology. It does give the average John Doe a satisfactory review and understanding of how much has been "junked" and how much progress is really being made.

MAN AND THE BIOLOGICAL WORLD, by J. S. ROGERS, C. F. BYERS and W. L. BRUDON. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. 1952. 671 pp., 373 illus. \$5.75.

574 QH308.R6 51-12946

Nine years ago this first appeared. It has been rewritten in parts, among which we note the complete change of mitosis and meiosis in line with more recent research. The section on evolution has been brought up to date. Hormones, vitamins, and blood physiology appear under one heading.

MANUAL OF BIOLOGY, by DOUGLAS MARSLAND. Henry Holt & Co., 383 Madison Ave., New York 17, N. Y. 1952. Part I, Protozoa and the Plants, 162 pp., 77 fig. \$2.00. Part II, The Metazoan Animals, 207 pp., 82 fig. \$2.00.

574.02 52-7027

This is the first revision since the original publication in 1939 for the use of Washington Square College students at New York University. It will undoubtedly have as much success as its predecessor.

METHOD OF ANATOMY, by J. C. BOILEAU GRANT. The Williams & Wilkins Co., Baltimore 2, Md. 1952. 870 pp., 862 fig. \$7.00.

611 QM23.G68 52-3698

Professor Grant's position in anatomy at the University of Toronto, as well as the fact that this is the fifth edition of a work which has a total of fifteen reprintings in the preceding four editions, indicate the worth of this manual of human anatomy. The few changes from the fourth edition have been in the direction of incorporating the most recent research findings into the original text.

METHODS OF STATISTICAL ANALYSIS, by CYRIL H. GOULDEN. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 467 pp., fig. & tables. \$7.50.

311.2 HA29.G7 52-9544

The author is with the Canadian Department of Agriculture as Chief of the Cereal Division in the experimental farms service. He is statistically interested in the increase of efficient plant breeding. This book is designed for the general field of applied statistics. In bringing this second edition up to date, the author includes modern methods of computation for partial and multiple correlation, a comprehensive coverage of the discriminant function, the theory and example of probit analysis, and studies of quality control, etc.

THE MIGHTY LEAF, by JEROME E. BROOKS. Little Brown & Co., 34 Beacon St., Boston 6, Mass. 1952. 361 pp. \$5.00.

338.17371 SB273.B87 52-9094

This is the brief story of tobacco in history. The author won a reputation for his four-volume encyclopedic work on the same subject. This volume is not a mere digest of the larger work. It is full of curious information, as for instance the way in which the term nicotine originated from the French Ambassador to Portugal in 1560, Jean Nicot. The historically authenticated incidents in the spread of tobacco use from the pipe, through the cigar to snuff and the cigarette have all been faithfully recorded. Both users and abusers of tobacco will find

a wealth of congenial information here.

THE MOLECULAR ARCHITECTURE OF PLANT WALLS, by R. D. PRESTON. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 211 pp., 67 fig., 9 plates. \$6.75.

581.8 52-14691

This book fills out some of the gaps in our knowledge of the cell walls of plants. Physico-chemical research has covered part of the subject. Frey-Wyssling has laid down the botanical approach. Since much of the work on cell wall structure was done in the author's laboratory at Leeds, there are a number of facts in this book which are new. So are some of the illustrations. The frontispiece, a 25,000x electron micrograph of Valonia outermost lamellar will be new and interesting to most readers.

MORPHOGENESIS IN PLANTS, by C. W. WARDLAW. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 176 pp., 42 fig., 4 plates. \$2.25.

581.4 52-14164

If all science books were as meaty, compact and cheap as the Methuen Monographs on Biological Subjects, libraries would be smaller but people could buy more books. This book is an attempt to set out some of the leading ideas relating to morphogenesis in plants, illustrating positive results thus far achieved. Obviously, apical cells come in for extended consideration. Embryology, shoot apices, leaf formation, mathematical relationships, biochemical regulators, and genic mutations are all considered. Not bad, in 176 pages at two and a quarter.

NATURE AND PROPERTIES OF SOILS, by T. L. LYON, H. O. BUCKMAN, N. C. BRADY. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1952. 591 pp., text fig. and tables. \$5.75.

631.4 S591.L75 Agr 52-460

This, the fifth edition as revised by Buckman and Brady, has been evoked by the rapid advance of soil science in the ten years that have passed since the fourth was produced. To bring their original project up to date re-

quired the rewriting of all but five of the original chapters. Since this book is now intended for use at the college sophomore or junior levels, it has been liberally interlarded with stimulating illustrations, maps, diagrams and half-tones.

NATURE AND SIGNIFICANCE OF THE ANTIBODY RESPONSE, edited by A. M. PAPPENHEIMER, JR. Columbia University Press, 2960 Broadway, New York 27, N. Y. 1953. 227 pp., text fig., charts & plates. \$5.00.

616.97

The New York Academy of Medicine held its 1951 symposium on 21-22 March and devoted itself entirely to antibody response. There are fourteen papers in this volume, each by a recognized authority, each with a lengthy bibliography, each sounding the theme of the underlying biological significance of immune reactions. The use of radio-active tracers in the study is reviewed.

NEW MANUAL FOR THE BIOLOGY LABORATORY, by B. R. WEIMER & E. L. CORE. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 33 pp., 163 fig. \$3.50.

574.02

Designed to accompany the well-known Strasbaugh and Weimer "General Biology," this laboratory manual is spiral bound with every page detachable and punched for a standard five-ring binder.

THE OCEAN RIVER, by HENRY CHAPIN & F. G. WALTON SMITH. Charles Scribner's Sons, 597 Fifth Ave., New York 17, N. Y. 1952. 325 pp. \$3.50.

551.471 GC296.G9C45 52-12093

With much better authentication than another recent geographical book of the month, this volume, backed by the reliable names of its historian-anthropologist and oceanographer-biologist authors, should become equally popular. It might lack the very wide appeal of most books about the ocean in that it is devoted to the Gulf Stream, the maritime history of the world with which it has been associated, and the industries that have risen out of it. It is a thrilling, a readable, and a very reliably scientific

book. Each of the fourteen chapters has its own bibliography.

OUTLINE OF GENERAL PHYSIOLOGY, by L. V. HEILBRUNN. W. B. Saunders Co., West Washington Square, Philadelphia 5, Pa. 1952. 818 pp., 123 fig. \$10.50.

612 QP34.H4 52-11360

This third edition of a popular textbook will hold the position gained by its predecessors. It is a monumental work for a textbook, with nearly four thousand author citations, and over five thousand lines of subject index alone. Dr. Heilbrunn's third preface to the general reader is admirably brief. His note to students is capital advice. The whole book is fascinating reading even to one who is not particularly or officially connected with physiology. Few modern authors can equal Dr. Heilbrunn in clear idiomatic English prose, which unfortunately cannot be said of all biologists.

PHARMACOLOGY AND TOXICOLOGY OF URANIUM COMPOUNDS, Parts 3 and 4, edited by CARL VOEGTLIN and HAROLD C. HODGE. The McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. 1953. pp. 1087-1778 + XVII + 30 and 1779 — 2466 + VI. \$18.00.

615.9

Subtitled "Chronic Inhalation and Other Studies," these two volumes carry on the reports of the Manhattan Project Technical Section as published for the Atomic Energy Commission in the "National Nuclear Energy Series." This volume is concerned with chronic inhalation toxicity of uranium compounds and the mechanism of uranium poisoning. The research on these lines has contributed much to our knowledge of normal calcification and cellular metabolism. In addition, there is further evidence of tolerance to uranium poisoning, and the modes of pulmonary retention of particulate matter. There is a literature review of the biological effects of uranium compounds on plants and a general bibliography of the biological effects of uranium. Chapter 28 is devoted to special materials, boron halides and fluorinated hydrocarbons. There is a resume of chapters 18 to 28 and a complete index of all four parts from pages 1 to 2466.

PHOSPHORIC ACID, PHOSPHATES AND PHOSPHOTIC FERTILIZERS, by WM. H. WAGGAMAN. Reinhold Pub. Cor., 330 West 42nd St., New York 36, N. Y. 1952. 683 pp., illus., text fig., tables, etc. \$15.00.

631.85 668.6 TP-245.P5W3 52-9791

This is the second edition of a work aimed both at the producer and the consumer of phosphate rock. The twenty-nine chapters are contributed by various authorities in the field.

PHYSIOLOGY OF SEEDS, by WM. CROCKER & LELA V. BARTON. Chronica Botanica Co., Waltham, Mass.; Stechert-Hafner, Inc., New York, N. Y. 1953. 267 pp., 7 fig. \$8.50.

581.3

Written from the view point of the investigator of seed germination problems, this book is aimed at the world's breadbasket. Among the more interesting chapters are those on water relations of seeds, respiration, germination factors, dormancy, and vernalization.

PLANT ANATOMY, by KATHERINE ESAU. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1953. 735 pp., 182 fig., 85 plates, 2 tables. \$9.00.

581.4

52-13796

It is a long time since so compendious a work on plant anatomy has appeared in the United States, with the author frankly admitting that her research interests in developmental anatomy have colored her presentation of the subject. The presentation follows traditional lines, but is always fuller. The author has kept abreast of all the recent literature. While the text figures are scattered through the book wherever needed, the plates are all located at the end of the book just before the indices. These plates make up the most satisfactory gallery of biological photography we have seen in years. Most of them are original and, therefore, new to our literature. They must be seen to be appreciated.

PLANTS OF THE BIBLE, by HAROLD N. & ALMA L. MOLDENKE. Chronica Botanica Co., Waltham, Mass.; Stechert-Hafner, Inc., New York, N. Y. 1952. 328 pp. + XX, 95 illus. \$7.50.

220.858

BS665.M6

52-12737

The Curator and Administrator of the New York Botanical Garden Herbarium has been working on and off over twelve years on this volume. His wife has been with him in much of his work. Between them they have produced a volume of considerably more than scientific interest. At first sight the casual reader will be impressed with the extraordinary collection of botanical wood cuts from old bibles and monuments dating back to the catacombs. In the body of the work 230 plant forms, from *Acacia nilotica* to *Zostera marina*, are discussed. In each case the plant name is followed by citations of passages in the King James Authorized Version of the Bible which will be familiar to most botanists. (Some of these citation lists are lengthy; those for *Taiticum* and *Vitis* take up two pages each.) In all cases the three versions of the Bible in use in Protestant, Catholic and Jewish circles have been consulted, both in the older translations and in their most recent revisions. The discussions which follow are invariably interesting, ranging as they do through biblical lore, Christian hagiology, and devotional literature, through discussions of soils, ecology, taxonomy, and down to quotations from English literature. The last 47 figures are glossy reproductions of plant drawings, herbarium specimens, photographs, or art works of the great masters who were adept at plant reproductions. Botanists may take a certain smug satisfaction in this contribution to a better understanding of the "Book of Books," and dare the zoologists to do as well for the animals of the Bible, which badly needs doing.

PLANT PHYSIOLOGY, by BERNARD S. MEYER & DONALD B. ANDERSON. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, N. Y. 1952. 784 pp., 183 fig. \$8.50.

581.1

QK711.M46

52-9251

This is the second edition of the original 1939 textbook which proved so popular that it ran through thirteen reprintings—an average of one every year up to now. Parenthetically, this should establish some sort of a record for textbooks, only the Bible doing better. In their revision of their or-

(Continued on page 101)

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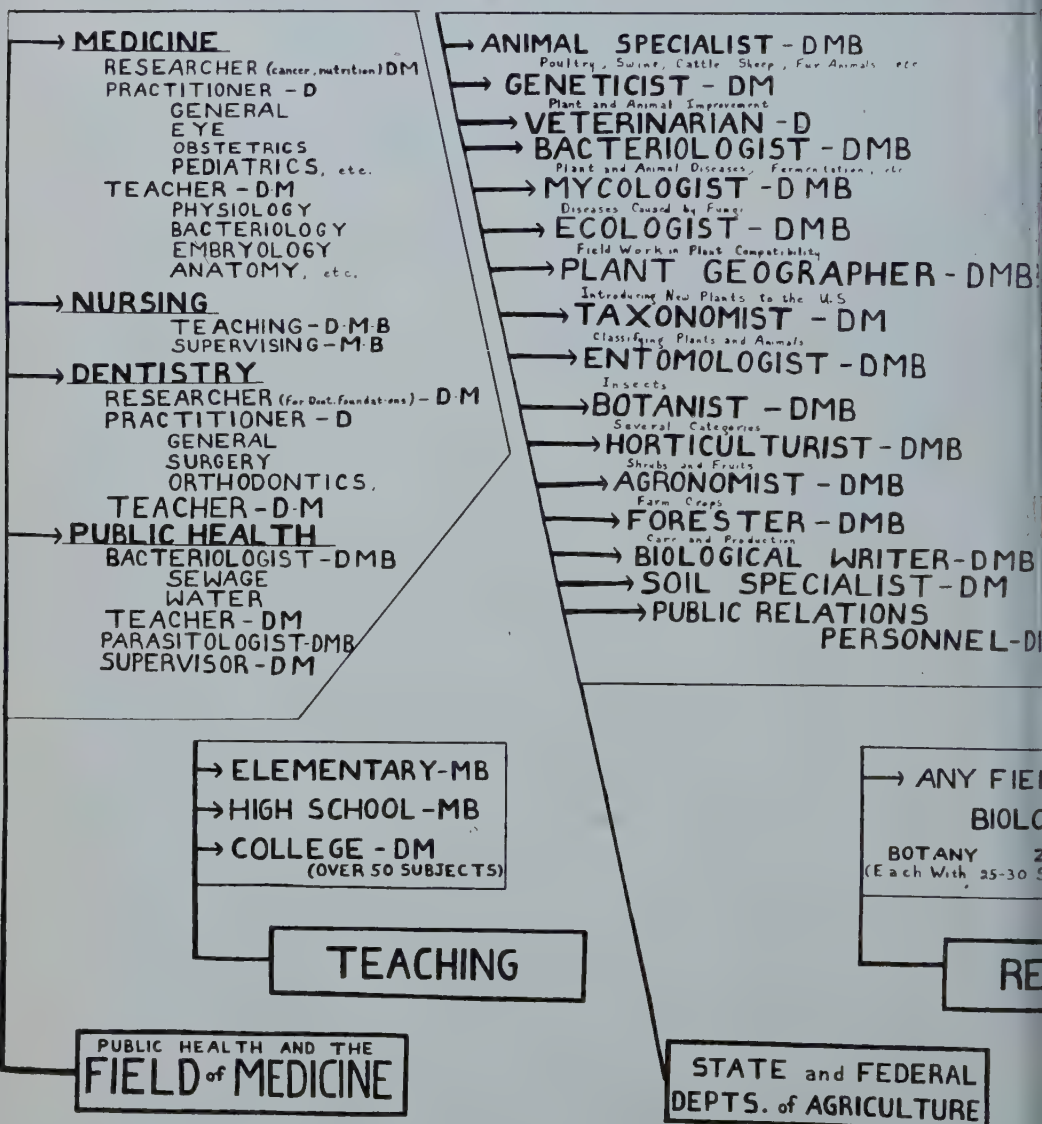
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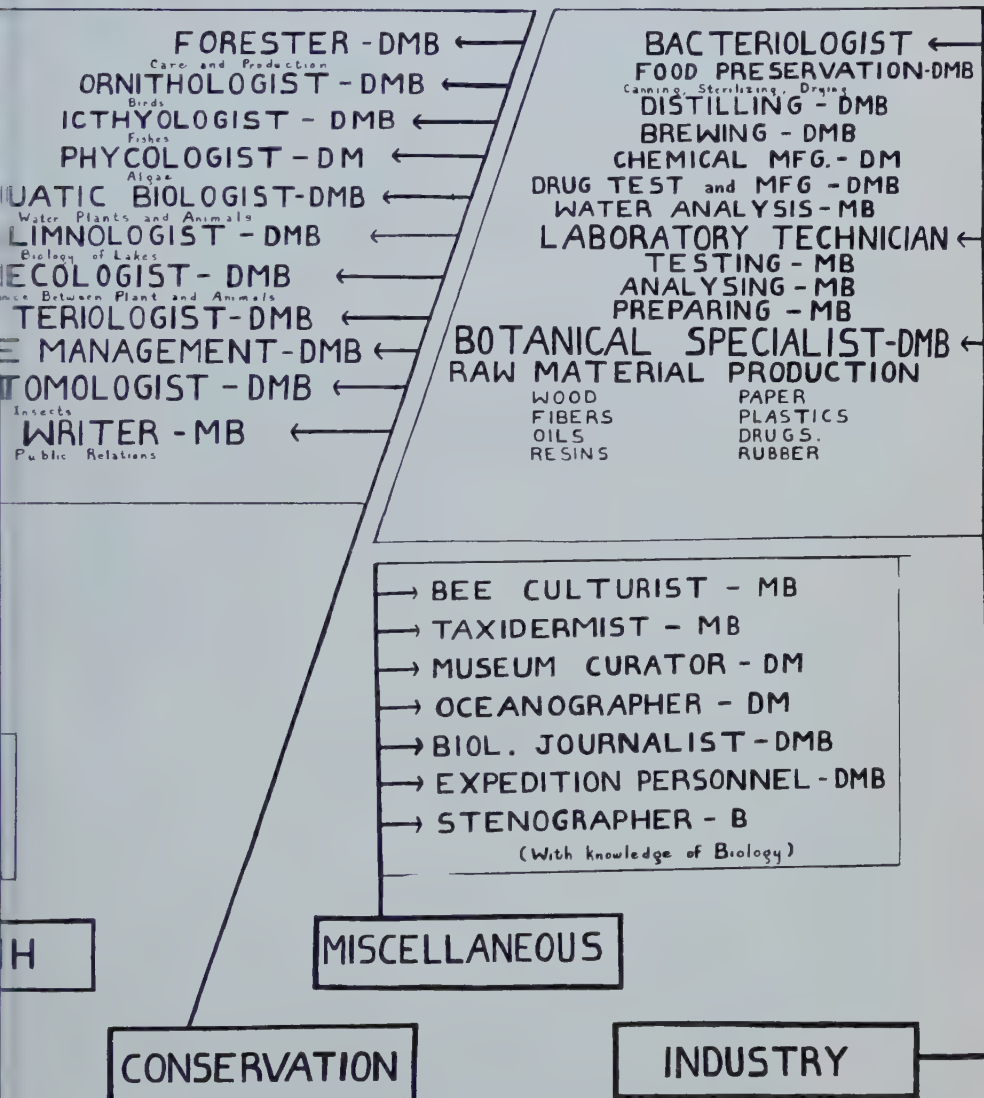


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New Books

(Continued from page 96)

iginal work, the authors have practically rewritten the entire book. Modifications in content reflect the advances in our knowledge of plant physiology during this period. Since many students who take plant physiology do so incidental to other advanced biology courses, the authors have consistently kept ecological factors in view. Discussion questions are appended to most of the chapters.

POLLEN MORPHOLOGY AND PLANT TAXONOMY, by G. ERDTMAN. The Chronica Botanica Co., Waltham, Mass. 1952. 539 pp., 261 illus. \$14.00.

582.1

From the Palynological Laboratory at Bromma (Stockholm) comes this new volume on Angiosperm pollen. Its price will probably put it out of the range of average faculty or student pocketbooks. It is based on a collection of 10,000 microscopic slides of pollen gathered all over the world. The drawings are mostly from the author's originals. There is a 42-page bibliography.

PASTURAL DEVELOPMENT OF INFANT CHIMPANZEES, by AUSTIN H. RIESEN & ELAINE F. KINDER. Yale University Press, New Haven, Conn. 1952. 204 pp., 34 fig., 18 tables. \$5.00.

599.82 QL737.P9R5 52-9271

The Associate Professor of Psychology of the University of Chicago, and the Supervisor of the Psychological Inter-Program, New York Department of Mental Hygiene, unite here in a monograph on a comparative study based on the Gessell Behavior Examination of infant chimpanzees. The authors are only in the beginning of this problem. For the start, this study has been completed because pastural development is fundamental to almost every form of behavior.

PRINCIPLES OF INVERTEBRATE PALEONTOLOGY, by ROBERT R. SHROCK & WILLIAM H. TWENHOFEL. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. 1953. 816 pp. \$12.00.

592 52-5341

This is a revised and enlarged edi-

tion of these authors' original 1935 "Invertebrate Palaeontology." In it some 22 phyla of invertebrates are treated on the basis of the fossil record. This treatment is taxonomic from the start. Living forms (if any) are described. The evolutionary history and relationship are discussed. Each chapter also has an appended list of selected references.

PRINCIPLES OF ORGANIC EVOLUTION, by A. W. LINDSEY. The C. V. Mosby Co., 3207 Washington Ave., Saint Louis 3, Mo. 1952. 375 pp., 216 fig. \$5.75.

575 QH366.L46 52-10812

This book is divided into five sections which are mostly subdivided into the 21 chapters. The sections treat respectively of the relationship of organisms, evidences of evolution, the evolution of existing forms, the process of evolution, and the importance of evolution in human life. The author is Professor of Biological Science in Denison University, Granville, Ohio.

REGENERATION AND WOUND HEALING, by A. E. NEEDHAM. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 152 pp., 5 figs., 3 tables. \$1.75.

591.3

Another of those handy little Methuen Monographs which pack so much in such small space. This one takes up the fascinating subject of regeneration. It discusses the metabolism, rates, causes, distribution and significance of regeneration.

RESPIRATION IN PLANTS, by WALTER STILES & WILLIAM LEACH. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 172 pp., 102 fig. \$2.25.

581.12 Agr 32-1264

This is the third edition of the 1932 production by the same title with the last chapter changed to bring it up to the latest research. Its three main chapters treat of respiration of normal plants under aerobic conditions: anaerobic respiration; and the revised mechanism of respiration.

THE SENSATIONS, by HENRI PIERON. Yale University Press, New Haven, Conn. 1952. 469 pp., 55 fig. \$6.00.

612.8 QP435.P515 52-30549

The author is the Director of the Laboratories of Physiological Psychology at the Sorbonne. This book covers the field of the sensations examining first the mechanisms of excitation, and then the basis of qualitative and quantitative discrimination.

SOIL MICROBIOLOGY, by SELMAN A. WAKSMAN. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 356 pp., 130 fig., 77 tables. \$6.00.

631.46 QR111.W19 52-9965

The soil teeming with life under our feet is the theme of this intermediary book. The author has tried to put it midway between his 1932 *Principles of Soil Microbiology* and his 1931 *Soil and the Microbe*. It has a heavy role to play as a broad outline of the subject, a sort of philosophy of soil microbiology, the complex microbiological population of the soil and its role in soil fertility and growth. It will find uses as a textbook rather than as a mere reference work.

SOIL CONSERVATION DISTRICTS IN ACTION, by W. ROBERT PARKS. Iowa State College Press, Press Building, Ames, Iowa. 1952. 242 pp., 21 fig., 3 tables. \$3.50.

631.45 S624.A1P3 52-13801

This is a more or less informal and complete report on the results obtained over a 15-year period by the adoption in certain states of the soil conservation district program.

SOLUBLE SILICATES, by JAMES G. VAIL. Reinhold Publishing Corp., 330 West 42nd St., New York 36, N. Y. 1952. Vol. I, 375 pp., tables, fig., etc. \$9.00. Vol. II, 600 pp., tables, fig., etc. \$15.00.

661.2 TP245.S5V3 52-8812

These two volumes are the only treatise to offer a complete review of the known properties and industrial applications of soluble silicates. The first volume is theoretical, covering old and new manufacturing processes, properties of different systems of glasses, metallic silicates, etc. The second and larger volume is more practical in discussing film formation, the use of gels, their properties as catalysts, etc.

SUBTROPICAL GARDENING IN FLORIDA, by NIXON SMILEY. Uni-

versity of Miami Press, Coral Gables, Fla. 1951. 182 pp., 20 fig. 634.909759 SB405.S64 Agr 52-15

Apparently pretty much of a community project, this book is almost completely the work of Miamians. It is a practical guide for anyone living far down the state. It is also a nostalgic book for those who have lived and learned to love Florida, or any other subtropical land for that matter.

SYMPOSIUM ON RADIOBIOLOGY, edited by JAMES J. NICKSON. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 465 pp., fig., etc. \$7.50.

612.014482 QH505.587 52-5046

This symposium of 23 essays on a vibrantly important and thought-provoking subject was held at Oberlin College, 14-18 June 1950. Much of the value of the report is lost for reference purposes by the absence of any kind of an index.

TEXTBOOK OF BACTERIOLOGY (Zinssers), by SMITH, CONANT, BEARD, POPE, SHARP & POSTON. Appleton-Century-Crofts, Inc., New York, N. Y. 1952. 1012 pp., 330 fig. \$11.00.

616.01 QR46.Z5 52-3802

This tenth edition is produced by six faculty members of the Duke University School of Medicine. As such, it is eminently adapted for the technicians and the training of technicians of which medical schools cooperate in the production.

TEXTBOOK OF BOTANY, by E. N. TRANSEAU. H. C. Sampson & L. H. Tiffany. Harper & Brothers, 49 East 33rd St., New York 16, N. Y. 1953. 817 pp., 424 illus. \$6.00.

580.2 52-12771

This is the second edition of the original 1940 volume, considerably revised, with two whole chapters rewritten, and many new illustrations. As in the previous edition, the authors try to carry students from relatively simple situations through increasingly complex ones, not only in each major topic but in the book as a whole. Scientific facts are stated scientifically, and scientific conclusions are drawn from them.

TEXTBOOK OF HISTOLOGY, by ALEXANDER A. MAXIMOW & WILLIAM

BLOOM, W. B. Saunders Co., Philadelphia, Pa. 1952. 616 pp., 986 illus. (257 in color), 580 fig. \$10.00.
611.018 QM551.M38 52-2125

Dr. Bloom and his associates at the University of Chicago have carried on the Maximow tradition in this new sixth edition of his well-known text. They have not spared the scissors on outworn passages. Much of the book has been tightened up and compacted, in order to make room for the revisions, which will bring the book into line with the rapid rate of increasing histological knowledge.

TEXTBOOK OF PHYSIOLOGY, by WILLIAM D. ZOETHOUT & W. W. TUTTLE. The C. V. Mosby Co., 3207 Washington Ave., St. Louis 3, Mo. 1952. 692 pp., 302 illus., 5 color. \$4.75.
612 QP34.Z6 52-13513

This is the eleventh edition of a much used text which was originally aimed at dental, pharmacy and normal schools in which only from 50 to 150 hours could be devoted to the subject. Several chapters have been rewritten in the light of new developments since the last printing. With rare restraint, the authors have resisted the many requests and suggestions for them to expand the original compass of the work into the many interesting sideline topics which plague the earnest physiologist.

TROPICAL RAIN FOREST, by P. W. RICHARDS. Cambridge University Press, 32 East 57th St., New York 22, N. Y. 1952. 450 pp., 43 fig., 39 tables, 27 illus. \$12.50.
634.98 52-14278

This is one of those rare books which becomes a "must" for the ecological section of the library. Since the last reprint of Schimper's "Plant Geography" in 1935, there has been nothing definitive added to our general knowledge of this great unknown area. It is not generally realized that about half the earth's forest surface is tropical rain forest. This book deals with the earth's moist tropical lowlands. It contains important information for geographers, ecologists, foresters, botanists and zoologists the world over.

ULTRAVIOLET RADIATION, by LEWIS R. KOLLER. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 1952. 270 pp., fig. \$6.50.
535.6 QC459.K6 52-8070

The number of uses to which biology, not to say industry or medicine, is putting ultraviolet radiation warrants the publication of this book by one whose position as research associate at the General Electric Research Laboratory makes him familiar with most of the important phases of the subject.

VERTEBRATE ZOOLOGY, by G. R. DE BEER. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1953. 435 pp., 185 fig. \$5.50.
591.02

This book first appeared in 1928. Of that first there were by 1948 eight printings. This speaks for itself. This second edition adheres to the general plan of its predecessor. It has been brought up to date by the inclusion of more important recent advances in knowledge, all presented so as to preserve the solid grounding in vertebrate zoology for which the original work became favorably known.

YOUR COMMUNITY'S HEALTH, by DEAN FRANKLIN SMILEY & ADRIAN G. GOULD. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 1952. 454 pp., 120 fig. \$5.00.
614 RA425.S6 52-4880

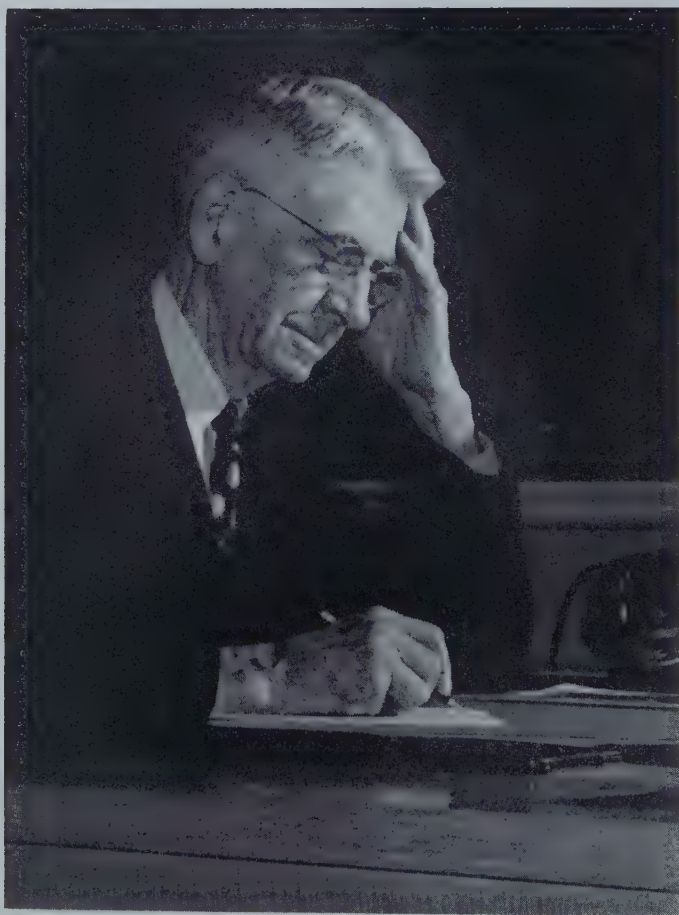
This is a revision of "Community Hygiene" previously published in 1929, 1935 and 1941. The aim of the work is to produce a citizenry interested in public health affairs, and contributing towards this democratic ideal. The five sections of the book treat of the development of community health, control of health hazards, attack on disease, needs of population groups, and agencies for improving health and welfare.

BOUND IN PAPER

LIPID METABOLISM, by R. T. WILLIAMS. Cambridge University Press, 32 East 57th St., New York 22, N. Y. 1952. 102 pp. \$2.75.

MAMMALS OF KANSAS, by E. LENDLE KOCKRUM. University of Kansas,

(Continued on page 137)



EDWARD W. MILLIGAN
Vice-President
The Kistler Stationery Co.

EDITORIALS

MR. MILLIGAN RETIRES

Although the first two volumes of "The Biologist"—from 1916 to 1921—emanated from Alpha Chapter at Ohio State University, all its succeeding issues were printed in Denver, Colorado. Somewhere along the years the W. H. Kistler Stationery Company came to be the official printers for Phi Sigma. At the head of their print shop was Mr. E. W. Milligan, who became a great personal friend of one of the early Editors, Mr. Erwine Hall Stewart, our Vice-Chancellor. From the very start, Mr. Milligan took a very special interest in Phi Sigma and its bulletin, "The Biologist." That gentleman is now about to retire from active duty. It is with keen personal regret that the Editor of "The Biologist" pens this tribute to Mr. Edward W. Milligan.

Our first personal contact with Mr. Milligan came in the Winter of 1934 when the Council members met at the University of Denver. On March seventeenth, Epsilon Chapter held a complimentary dinner in their honor at the Lambda Chi Alpha House. Mr. Milligan was also a guest at that dinner. That meeting forged a bond of mutual esteem between printer and editor which has lasted through the nineteen years of our acquaintance.

Phi Sigma's "Biologist" has been remarkable among fraternity publications in the neatness of its format and in its nearly absolute freedom from errors of punctuation and spelling. This, in spite of the fact that scientific terminology, the bugaboo of type setters, printers and proof readers, has always been freely present on its pages. To no one else can the credit for our periodical's make-up and dress-up go, than to Edward W. Milligan. One might easily and truthfully say that he missed his calling. His love for the printed word would have qualified him as a College Librarian. His "feel" for accuracy, down to the last italic or comma, would have made him a valuable research assistant. His patience under the strains of early editorial shifting policies and later editorial temperament have proven him a Christian gentleman. More than this one needs not say.

We all who have had any connection with "The Biologist" wish him many happy, healthy and carefree years in his retirement. He has certainly earned them. In testimony of this fact, your Editor has taken liberty to dedicate this issue to a gentleman and a printer who has served Phi Sigma long and faithfully.

PHILATELISTS, ATTENTION!

To the uninitiated, a Philatelist is a member of the great unofficial fraternity of those who collect stamps or stamped envelopes as a profession, as a hobby, or just for the sake of having something to do. Philately, like numismatics and archaeology, is a valuable adjunct to the historical side of the social sciences. As a hobby philately, or just plain stamp collecting, is a great adventure. It captures the imagination of the young; it diverts the mind of harassed middle age, it solaces and entertains the old. To put it simply, it's great stuff, and once you get really into it you never really get out of it. Every letter and every piece of parcel post, especially if it comes from foreign countries, is a challenge to your interest and your acquisitive nature.

Even as any of the biological sciences can be approached from the morphological, the physiological or the taxonomic angle, so philately has its subdivisions of approach. Some philatelists, in fact most of them at the start, confine their stamp interests to country of origin. Rare stamps are at a premium among those who wish to build up a complete set of all the issues from out-of-the-way and not too well-known foreign countries or provinces.

More recently philatelists have discovered other avenues of activity in their interesting field. They collect, not by country or province, but by topic. Topical collecting may range through almost any phase of stamp printing. There are many angles from which to approach this type of collecting, as for instance, buildings, ships, aviation, religion, famous women, statesmen, military, art, and the like.

Biological interests, as one might easily suspect, have their philatelic angles too. There is a whole Biological Unit in the American Topical Association. They publish their own monthly periodical, "Biological Tid-Bits," which is a very happy name for a very interesting journal. It is in its second volume, of which the February 1953 issue is the tenth number. The journal is edited by the Rev. S. C. Becker of St. Norbert College, West De Pere, Wisconsin, assisted by Harold D. Bearce, 8242 Flora, Kansas City 5, Missouri. Those who are interested should write to the Secretary of the Unit, Dr. Willard F. Stanley, State University Teachers College, Fredonia, New York.

Zeta Chapter zoologists of the 1945-46 period will remember Father Becker as a fellow Phi Sigma of the Wisconsin Chapter.

WHICH WAY THE CURVE?

This issue of "The Biologist" is loaded. We hope that it arrives on every campus in an auspicious moment so that every member may read it carefully from cover to cover. We feel that if Phi Sigma is worth belonging to, it is worth living up to. If it is worth living up to, it is worth spreading.

The law of the wild is that the unfit sooner or later perish. Like any living thing, a social organism must

reproduce or die. Nature has no time for unproductive occupiers of space. In the five-year periods since our founding in 1915, the number of chapters organized as shown below:

We have one year to go in the present five-year cycle. Plot this curve, you students of biometric statistics, and draw your own conclusions.

In this connection we call your earnest attention to the four articles on the expansion project which are to be found in our new "Phi Sigma at Large" section.

1915 to 1919 there were	5, of which	3 survive
1920 to 1924 there were	9, of which	4 survive
1925 to 1929 there were	14, of which	11 survive
1930 to 1934 there were	7, of which	5 survive
1935 to 1939 there were	3, of which	3 survive
1940 to 1944 (War yrs.)	1, of which	1 survive
1945 to 1949 there were	7, of which	5 survive
1950 to date there were	1, of which	1 survive

PHI SIGMA AT LARGE

By DR. ANSELM M. KEEFE, *Editor*

Foreword

The minutes of the St. Louis meeting of Phi Sigma last December have something to say about fraternity expansion. There is room for it within Phi Sigma, even as there is room for Phi Sigma on over a hundred campuses where at present it is not.

It is not too late in the year to get this program started. In fact, this is a good time. Put all the brains of the chapter to work, talk it up with the faculty and the honorary members in your locality, both on and off the campus. Look up the lists of former graduate students. Maybe one or many are now in universities or colleges eligible for a chapter.

Contact them, find out what the local situation is. Above all, let the Council know what you are doing so that we can keep the movement under control. It won't do for three or four chapters to make isolated and single contacts where a united front of many chapters, each working from a different angle, would bring enough pressure to swing the whole affair.

It has happened so often that five or seven or a dozen people may all be in one graduate department and never know that they are all brethren in Phi Sigma.

Your Editor has taken time out from other duties to prepare the four articles which follow this one. Each has a phase to be considered in this laudable objective. Read them over carefully, talk them over in chapter meetings, then roll up your sleeves and go to work!

Those Vacant Chairs

More or less of a national ballad is a plaintive song with a name somewhat like the title of this article. Every home sooner or later has its vacant chair. So does every fraternity house, especially in times of war, or

"police actions." So does every fraternity which is organized on a national scale.

Sooner or later, the inexorable evolutionary processes in nature eliminate the unfit, the unwary or the unwise living organisms. Those social organisms to which the same characteristics can be applied seem destined for a similar fate. Why some of the most promising chapters of Phi Sigma have "folded their tents like the Arabs, and as silently" stolen away, will perhaps always be a mystery. There is no secret why some of them disbanded.

In the hope that conditions on their several campuses have changed sufficiently to warrant reviving their charters, we list them here, with the year of their founding and the last year they were mentioned as active in "The Biologist."

Alpha—University of Ohio, Columbus; 1915-1925.

Gamma—(Reserved for a chapter never founded.)

Delta—University of Maine, Orono; 1917-1934.

Theta—Michigan State College, Lansing; 1921-1936.

Iota—Washington University, St. Louis; 1921-1938.

Mu—University of California, Berkeley; 1922-1944.

Xi—University of Nebraska, Lincoln; 1924-1935.

Omicron—University of North Dakota, Grand Forks; 1924-1928.

Tau—Duke University, Durham, N. C.; 1926-1942.

Alpha Gamma—University of South Dakota, Vermillion; 1928-1931.

Alpha Delta—Lawrence College, Appleton, Wisconsin; 1929-1935.

Alpha Zeta—William & Mary College, Williamsburg, Virginia; 1930-1938.

Alpha Theta—State College of Washington, Pullman; 1930-1943.

Alpha Sigma—University of Texas, Austin; 1946-1950.

Alpha Tau—National University of Mexico, D. F.; 1947-1948.

These are the vacant chairs in the long roster of the forty-seven chapters that at one time might have comprised Phi Sigma. It may very well be that some of these chapters can never be revived. Circumstances may have risen which would permanently preclude any effort to do so. But,—and this is encouraging,—there are signs that some of these campuses may not be inhospitable to resuscitated chapters. There is work here for the live chapters, work that needs doing. Every one of these former Phi Sigma units is a challenge to every living member, here and now.

The Gentlemen's Agreement

Between the two biological societies, Tri Beta (Beta Beta Beta) and Phi Sigma there has been a long-standing gentlemen's agreement that neither would establish on a campus where the other had a chapter in operation. It was also reciprocally agreed that Tri Beta would confine its future chapter installations to those undergraduate schools where only bachelor's degrees are granted, while Phi Sigma would establish chapters only in schools where there is graduate as well as undergraduate work.

Since we are considering an active campaign for the good of Phi Sigma, it becomes increasingly important that we drop any consideration of the following institutions which are listed in the Beta Beta Beta rosters:

Alabama College (for women), Montevallo, Ala.

Albion College, Albion, Mich.

American University, Washington, D. C.

Arkansas State College, Jonesboro, Ark.

Augustana College, Rock Island, Ill.

Baylor University, Waco, Texas.

Bethany College, Bethany, West Va.

Bowling Green State University, Bowling Green, O.

Brigham Young University, Provo, Utah.

California State Polytechnic College, San Louis Obispo, Calif.

California University, Santa Barbara, Calif.

Canisius College, Buffalo, N. Y.

Carroll College, Waukesha, Wis.

Carthage College, Carthage, Ill.

University of Chattanooga, Chattanooga, Tenn.

University of Puerto Rico, College of Agr. & Mech. Arts, Mayaguez, P. R.

Colorado A. & M. College, Fort Collins, Colo.

Colorado Western State College, Gunnison, Colo.

Cornell College, Mount Vernon, Iowa.

Delta State Teachers College, Cleveland, Miss.

De Paul University, Chicago, Ill.

De Pauw University, Greencastle, Ind.

Drake University, Des Moines, Iowa

Drew University, Madison, N. J.

Drury College, Springfield, Mo.

Fresno State College, Fresno, Calif.

Georgetown College, Georgetown, Ky.

Gettysburg College, Gettysburg, Pa.

Hamline University, St. Paul, Minn.

Harris Teachers College, St. Louis, Mo.

Hartwick College, Oneonta, N. Y.

Hofstra College, Hempstead, N. Y.

Hood College, Frederick, Md.

Hope College, Holland, Mich.

Huntington College, Montgomery, Ala.

Iowa State Teachers College, Cedar Falls, Iowa.

Iowa Wesleyan, Mt. Pleasant, Iowa.

John B. Stetson University, Deland, Fla.

Kansas State Teachers College, Emporia, Kan.

Lake Forest College, Lake Forest, Ill.

Louisiana Northwestern State College, Natchitoches, La.

Marietta College, Marietta, Ohio.

Mary Baldwin College, Staunton, Va.

Miami University, Coral Gables, Fla.

Mississippi Southern College, Hattiesburg, Miss.

Mississippi State College, State College, Miss.

Mississippi State College for Women, Columbus, Miss.

Mississippi University, University, Miss.

Missouri Valley College, Marshall, Mo.

Monmouth College, Monmouth, Ill.

Morningside College, Sioux City, Iowa.

Murray State College, Murray, Ky.

Chadron State Teachers College, Chadron, Neb.
 Peru State Teachers College, Peru, Neb.
 Nevada University, Reno, Nev.
 Newcomb College, New Orleans, La.
 North Carolina Women's College, Greensboro, N. C.
 North Central College, Naperville, Ill.
 Northwestern University, Evanston, Ill.
 Notre Dame College of Maryland, Baltimore, Md.
 Oklahoma City University, Oklahoma City, Okla.
 Southwestern State College, Weatherford, Okla.
 Pacific College, Stockton, Calif.
 Peabody College, Nashville, Tenn.
 Pennsylvania State Teachers College, Edinboro, Pa.
 Pittsburgh University, Pittsburgh, Pa.
 Portland University, Portland, Ore.
 Polytechnic Institute of Puerto Rico, San German, P. R.
 Puerto Rico University, Rio Piedras, P. R.
 Randolph-Macon College, Ashland, Va.
 Richmond University, Richmond, Va.
 St. Laurence University, Canton, N. Y.
 San Jose State College, San Jose, Calif.
 Simpson College, Indianola, Iowa.
 Spring Hill College, Spring Hill, Ala.
 Texas State College for Women, Denton, Texas.
 Texas State College North, Denton, Texas.
 Thiel College, Greenville, Pa.
 Toledo University, Toledo, Ohio.
 Wake Forest College, Wake Forest, N. C.
 Wartburg College, Waverly, Iowa.
 West Virginia Wesleyan College, Buckhannon, West Va.
 Western Maryland College, Westminster, Md.
 Westminster College, New Wilmington, Pa.
 Whitworth College, Spokane, Wash.
 William Jewell College, Liberty, Mo.
 Winthrop College, Rock Hill, S. C.
 Wittenberg College, Springfield, Ohio.

Contacts to be Made

One of the proposals arising out of the 1952 St. Louis meetings was the possibility of bringing the Phi Sigma Honorary Biological Society to the attention of a larger number of universities and colleges. The Editor does not have the most recent copy of "Lovejoy's College Guide." The following figures, therefore, are based on the 1948 edition of Dr. Brumbaugh's "American Universities and Colleges." As recently as that year these institutions:

1. Were in good standing with their regional accrediting associations.
2. Offered degrees higher than the bachelor's.
3. Had no chapter of Phi Sigma or of Beta Beta Beta as far as is now known.
4. Had biology staffs of sufficient size to warrant establishment of Phi Sigma chapters **if sufficient interest were shown** or could be stimulated.

This list gives the name and location of the institution, whether it confers the bachelor's and master's or doctor's degrees, and the enrollment for 1946-47.

Alabama Polytechnic Institute, Auburn, Ala. (BM) 6,198
 Alabama, University of, University, Ala. (BM) 8,626
 Alfred University, Alfred, N. Y. (BM) 870
 Arizona, University of, Tucson, Ariz. (BMD) 4,484
 Atlanta University, Atlanta, Ga. (BM) 2,110
 Boston College, Chestnut Hill, Mass. (BM) 4,863
 Boston University, Boston, Mass. (BMD) 14,810
 Brooklyn College, Brooklyn, N. Y. (BM) 13,343
 Brown University, Providence, R. I. (BMD) 4,353
 Bryn Mawr, Bryn Mawr, Pa. (BMD) 698
 Buffalo, University of, Buffalo, N. Y. (BMD) 9,442
 Butler University, Indianapolis, Ind. (BM) 4,858
 Catholic University of America, Washington, D. C. (BMD) 3,700

- Chicago, University of, Chicago, Ill. (BMD) 12,366
- Cincinnati, University of, Cincinnati, Ohio (BMD) 16,042
- City College, New York, N. Y. (BM) 29,261
- Clark University, Worcester, Mass. (BMD) 840
- Colorado College, Colorado Springs, Colo. (BM) 1,151
- Columbia University, New York, N. Y. (BMD) 29,245
- Connecticut, University of, Storrs, Conn. (BM) 6,707
- Cornell University, Ithaca, New York (BMD) 9,702
- Creighton University, Omaha, Neb. (BMD) 2,948
- Dartmouth College, Hanover, N. H. (BM) 2,822
- Delaware, University of, Newark, Del. (BM) 2,263
- Detroit, University of, Detroit, Mich. (BMD) 7,489
- Fisk University, Nashville, Tenn. (BM) 976
- Fordham University, New York, N. Y. (BMD) 8,150
- George Peabody College, Nashville, Tenn. (BMD) 1,767
- George Washington University, Washington, D. C. (BMD) 14,911
- Georgetown University, Washington, D. C. (BMD) 4,291
- Gonzaga University, Spokane, Wash. (BM) 1,620
- Harvard University, Cambridge, Mass. (BMD) 12,076
- Haverford College, Haverford, Pa. (BM) 465
- Hawaii, University of, Honolulu, H. T. (BM) 2,962
- Howard University, Washington, D. C. (BMD) 6,187
- Idaho, University of, Moscow, Idaho (BM) 3,451
- Illinois Institute of Technology, Chicago, Ill. (BMD) 7,377
- Illinois State Normal, Normal, Ill. (BM) 1,800
- Illinois Wesleyan University, Bloomington, Ill. (BM) 1,131
- Indiana University, Bloomington, Ind. (BMD) 10,350
- Iowa State College of A & M, Ames, Iowa (BMD) 10,480
- Iowa State University, Iowa City, Iowa (BMD) 9,770
- Johns Hopkins University, Baltimore, Md. (BMD) 5,879
- Kansas City, University of, Kansas City, Mo. (BMD) 3,350
- Kansas State College, Manhattan, Kansas (BMD) 6,507
- Kent State University, Kent, Ohio (BM) 4,763
- Kentucky, University, Lexington, Ky. (BMD) 6,638
- Lehigh University, Bethlehem, Pa. (BMD) 3,375
- Louisiana State A & M College, Baton Rouge, La. (BM) 10,603
- Louisville, University of, Louisville, Ky. (BMD) 5,705
- Loyola University, Chicago, Ill. (BMD) 7,140
- Loyola University, New Orleans, La. (BM) 2,701
- Manhattan College, New York, N. Y. (BM) 2,242
- Marshall College, Huntington, W. Va. (BM) 3,333
- Maryland, University of, College Park, Md. (BMD) 11,020
- Massachusetts Institute of Technology, Cambridge, Mass. (BMD) 5,172
- Massachusetts, University of, Amherst, Mass. (BMD) 1,697
- Minnesota, University of, Minneapolis, Minn. (BMD) 27,103
- Missouri, University of, Columbia, Mo. (BMD) 14,125
- Mount Holyoke College, South Hadley, Mass. (BM) 1,191
- New York State College for Teachers, Albany, N. Y. (BM) 1,321
- New York University, New York, N. Y. (BMD) 41,787
- Niagara University, Niagara, N. Y. (BM) 1,701
- North Carolina, University of, Chapel Hill, N. C. (BMD) 6,802
- Notre Dame University, Notre Dame, Ind. (BMD) 4,532
- Oberlin College, Oberlin, Ohio (BM) 2,180
- Ohio University, Athens, O. (BM) 4,933
- Pennsylvania State College, State College, Pa. (BMD) 10,365
- Pennsylvania, University of, Philadelphia, Pa. (BMD) 18,649
- Princeton University, Princeton, N. J. (BMD) 3,938
- Purdue University, Lafayette, Ind. (BMD) 11,505
- Radcliffe College, Cambridge, Mass. (BMD) 1,274
- Rochester, University of, Rochester, N. Y. (BMD) 4,830

Rosary College, River Forest, Ill. (BM) 756
 St. Bonaventure College, St. Bonaventure, N. Y. (BM) 1,261
 St. John's University, Brooklyn, N. Y. (BMD) 6,308
 St. Louis University, St. Louis, Mo. (BMD) 10,328
 San Francisco, University of, San Francisco, Calif. (BM) 2,024
 Seton Hall College, South Orange, N. J. (BM) 8,534
 Simmons College, Boston, Mass. (BM) 1,538
 Smith College, Northampton, Mass. (BM) 2,249
 South Carolina, University of, Columbia, S. C. (BM) 4,167
 Stanford University, Stanford, Calif. (BMD) 7,203
 Stevens Institute of Technology, Hoboken, N. J. (BM) 1,694
 Syracuse University, Syracuse, N. Y. (BMD) 15,228
 Temple University, Philadelphia, Pa. (BMD) 14,829
 Tennessee, University of, Knoxville, Tenn. (BMD) 8,405
 Texas Christian University, Fort Worth, Texas (BMD) 3,200
 Tufts College, Medford, Mass. (BMD) 3,375
 Tulane University, New Orleans, La. (BMD) 5,953
 Tulsa, University of, Tulsa, Okla. (BM) 2,920
 Vanderbilt University, Nashville, Tenn. (BMD) 3,050
 Vermont, University of, Burlington, Vt. (BMD) 2,065
 Villanova College, Villanova, Pa. (BM) 3,232
 Virginia State College, Petersburg, Va. (BM) 1,213
 Virginia, University of, Charlottesville, Va. (BMD) 4,388
 Washington, State College of, Pullman, Wash. (BMD) 5,884
 Wayne University, Detroit, Mich. (BMD) 15,312
 Wellesley College, Wellesley, Mass. (BM) 1,685
 Wesleyan University, Middletown, Conn. (BM) 900
 West Virginia University, Morgantown, West Va. (BM) 6,015
 Western Reserve University, Cleveland, Ohio (BMD) 16,484
 Wheaton College, Wheaton, Ill. (BM) 1,539

Wichita, Municipal University of, Wichita, Kansas (BM) 2,810

Wyoming, University of, Laramie, Wyo. (BM) 3,364

Yale University, New Haven, Conn. (BMD) 8,643

Here, then, are one hundred and six challenges to the present chapters of Phi Sigma. Most of these schools do not know that our society exists. There is every probability in the world that there may be former chapter members on these campuses, who, if they knew the revised status of their own honor society, would be glad to undertake the establishment of a chapter on their new campus.

How to Start a New Chapter

This is a question that comes up at every biennial convention of Phi Sigma. It isn't at all difficult if you go at it the right way. Practically all the existing chapters started out alike. Alpha took the name Phi Sigma in 1915. Beta started in 1910 as the Natural Science Club of the University of Michigan. Epsilon was formerly Pi Beta Omega on the Denver campus. Zeta was the Lapham Biological Society at Wisconsin up to May 30, 1917. World War I caused a cessation in chapter organization, but by February 1921 the Axis Society of Akron had been accepted as Eta Chapter, and the Graduate Research Club at Michigan State was under consideration by "The Grand Chapter," as the Council was then known. Many other chapters were formed similarly later on.

Thus we see that the traditional policy has been for Phi Sigma to aggregate an existing organization to its roster or to be instrumental in starting some kind of a biological group, and then after it has worked together for a year or more, bring it into our Society as a new chapter.

The easiest way to start a chapter, then, is to induct an existing organization. Of course, it must be composed of students in the upper third of their classes, who must be actively interested enough in biology to want to

become members of a biological organization. In addition to this, their parent university or college should have a large enough faculty in biological fields to warrant the hope that there will always be someone on the campus sufficiently interested in Phi Sigma to keep the chapter alive, if not precisely thriving. A third requirement is that the college should have a graduate school and give at least one degree higher than a bachelor's. It goes without saying that the school must be duly accredited by the regional agency, and that there is no active or inactive chapter of Tri Beta (Beta Beta Beta) on the campus.

If all these requirements are met, all one has to do is to present the advantages of corporate membership in Phi Sigma to the members of the existing organization. As your Editor sees them, the advantages are:

1. Phi Sigma is the oldest existing biological fraternity in the country.
2. It holds membership in the "**Association of Honor Societies**," and as such, is represented in "The National Conference on College Fraternities and Societies."
3. It is the only **honor** society for biologists listed in Leland's "Fraternity Month" or Banta's "Greek Exchange."
4. It has a membership of 19,000, many of whom, especially among the earlier members, have now risen to the highest places in American or foreign biology.
5. It is more than a mere honor society. Since its first national constitution was adopted, it has always been designated as an honorary biological **research** society.
6. With this last idea in mind, Phi Sigma refuses to establish chapters on any campus where there is no graduate school.
7. Phi Sigma stands for scholastic excellence as well as productive scholarship.

Read over your copy of the Society's Constitution and By-laws and you will probably discover other arguments in favor of Phi Sigma.

Where there is no existing organization to adopt ready-made, it will take a little longer, but is not too difficult. With a little local help, a few interested kindred spirits can generally be found on almost any campus to form a nucleus around which to build a pilot organization for a future chapter.

In a great university, there will probably be a large oversupply of eligible personnel. Here are the fields from which the original chapters of Phi Sigma were recruited:

- Agriculture
- * Agricultural Chemistry
- Agronomy
- Anatomy
- Animal Husbandry
- Anthropology
- Apiculture
- Bacteriology
- Biology
- * Biochemistry
- Biometry
- * Biophysics
- Botany
- Cytology
- Dairying
- * Dental Sciences
- * Dietetics
- Ecology
- Embryology
- Entomology
- * Eugenics
- * Field Crops
- Fisheries
- * Forestry
- * Geology
- Genetics
- Histology
- * Home Economics
- Horticulture
- Hygiene
- Immunology
- * Medical Sciences
- Micrology
- * Nutrition
- * Oceanography
- Ornithology
- Palaeobotany
- Palaeontology
- Parasitology
- * Pathology
- Pharmacognosy
- Pharmacology
- Phytopathology
- Plant Chemistry
- Plant Physiology
- Physiology

* Psychology
 Soil Science
 Taxonomy
 * Veterinary Science
 Zoology

Asterisked fields indicated the necessity for a student being interested or working in the *biological* aspects of this branch of science. This is the list as it appeared in the September-December 1934 issue of "The Biologist." It is only a slightly emended form of the 1925 constitutional convention list as compiled in that first national meeting in Washington. The Editor feels that the following fields might well be considered as worthy of addition to the list:

Algology
 Animal Nutrition
 Animal Pathology

Endocrinology
 Enzymology
 Food Technology
 Limnology
 Medical Technology
 Phycology
 Wild Life Management

The Council will have to speak on this matter first.

It would be hard to find a college or university on the approved list of eligible institutions, given elsewhere in this issue, where enough of these subjects would not be taught. From among them a respectable number of intellectually high-ranking graduate students, seniors and juniors, ought to be available to form a pilot organization which could then petition for a charter.

WHAT IS YOUR CHAPTER DOING

to

Reactivate our Inactive Chapters?

Attract new Faculty Member Interest?

Elect a New Honorary Member Each Year?

Establish a New Chapter Somewhere?

Expand Your Own Chapter Membership?

WHY?

*When a Living Thing Stops Growing It has
 Begun*

To

DIE!

PROCEEDINGS OF THE ST. LOUIS MEETINGS



The Council arranging for last winter's general meeting. The session was held in the St. Norbert College Biology Library, during the Labor Day week-end. Right to left:—Chancellor Lagler, Vice-Chancellor Stewart, Treasurer Clare, new Secretary Orcutt, outgoing Secretary van der Schalle, Editor Keefe.

St. Louis, Missouri

December 28-29, 1952

(Meeting as part of A.A.A.S. program)

MORNING OF DECEMBER 28th

Registration and certification of delegates. This time was also very profitably spent in getting acquainted and for informal group discussions. A very friendly and informal tone was thus set for the whole convention.

AFTERNOON OF DECEMBER 28th

The first general session was called to order by Chancellor Lagler at 2:00 P.M. By way of introduction the Chancellor gave a brief description of what constitutes the Phi Sigma Society: He particularly emphasized that the individual members and chapters collectively constitute the society, and that

the function of the Council is to carry out the directives of the convention composed of the authorized delegates of the chapters. The Council serves to maintain the continuity necessary between the biennial General Meetings.

The Chair announced that accreditation had been accomplished for 21 delegates and two alternates. (Chair occupied by Chancellor).

Council members were introduced by the Chair, and regrets were read from Dr. van Cleave (President) and Dr. Ortenburger (Retiring Chancellor) who were not able to attend.

Roll call of the delegates and alternates showed all present.

General announcements were made important among which were: Several fine opportunities open to delegates in A.A.A.S. program. Council believes no

definite policy should be established regarding expense of delegates, but must be predicated on the situation at each meeting. The following factors must be considered in each case:

- a. Status of National Treasury
- b. Costs at place of meeting
- c. Number of delegates

The current policy can be simply stated as follows: A minimum of first class railroad fare shall be paid each delegate plus whatever the Council feels is possible to support at each convention.

Chancellor requested information from delegates as to any support for the convention trip from local chapter.

Result:

Number receiving support from local chapter	12
Number not receiving support	10

The 12 receiving support was further broken down as follows:

Meals, lodging & other expense	6
Meals	6

Of the 12 that received support, 9 were from medium-sized or large chapters.

Of the 10 that received no support from the chapters, 5 were from medium-sized or large chapters.

It was not intended to use these figures in any way except as general information for the delegates, chapters and Council.

Chancellor appointed the following committees:

Auditing: Bradley (Alpha Omega) Chairman; Foreman (Psi); Ekstedt (Beta); Donohue (Alpha Nu). Two non-voting observers were appointed to participate in the discussions: van Gelder (Rho) and Bergstrom (Upsilon). (Advisor—Treasurer Clare)

Nominating: Sutton (Alpha Pi) Chairman; Donovan (Nu); Russell (Omega); Saul (Alpha Lambda); and Kundert (Epsilon alternate). (Advisor—Vice Chancellor Stewart)

Biologist: Kreitzer (Alpha Omicron) Chairman; Kann (Kappa); Lentfer (Chi); Templeton (Alpha Rho). (Advisor—Editor Keefe)

Resolutions: Naum (Alpha Kappa) Chairman; Levin (Rho); Davis (Alpha Psi); and Winters (Alpha Alpha

alternate). (Advisor—Chancellor Lagler)

Constitutional Amendments: Costello (Alpha Alpha) Chairman; Carter (Epsilon); Lechleitner (Lambda); Iben (Alpha Eta); and Olah (Alpha Epsilon). (Advisor—Exec. Secretary Orcutt)

Chancellor directed the committees to meet that night and report to the convention as a whole at the next session.

Chancellor next called for reports from the chapters. Reports consisted of short statements on the operation of individual chapters.

(See Appendix A. for condensation of these reports)

Various problems of chapter operation and policy came up in these reports. The Executive Secretary listed such problems for further discussion. These are not itemized at this point because they all came up for consideration in one way or another later in the sessions.

All the chapter reports together with discussion and questions from delegates were completed except for two chapters; these were held over because of the lateness of the hour. The meeting was adjourned at approximately 5:30 P.M.

EVENING OF DECEMBER 28TH

Banquet was held at 6:00 P.M. Main address given by Dr. Stanley Cain, of the University of Michigan. (It will be published in the next issue of the Biologist.)

MORNING OF DECEMBER 29TH

Chancellor called the meeting to order at approximately 8:45 A.M. The two remaining chapter reports held over from the previous session were heard at this time.

Report of the Executive Secretary was called for and the following points were presented:

1. The Executive Secretary elected at the 1948 General Meeting, Dr. van der Schalie, reluctantly presented his resignation to the Council at its meeting in September 1952 because he had accepted a one year appointment in Egypt for the U. N. Health Organization. The Council elected Dr. Orcutt to an interim appointment to serve out

Dr. van der Schalie's unexpired term. The new Executive Secretary has attempted to make the transition as smooth as possible and hopes there has not been too much inconvenience to the chapters.

2. Report on initiates to date:

Total at time of 1950	
General Meeting	17,677
Initiates academic year	
1950-1951	984
Initiates academic year	
1951-1952	863
Initiates for the fall	
1952	164
Grand total Jan. 1, 1953	19,688

It was pointed out that there had been a steady fall in the number of initiates during the past several years, and that while the trend is not alarming it is serious, never-the-less. The effect that this trend has upon the financial structure of the society with its present initiation fee needs to be considered.

3. One new chapter has been admitted to the society since the last General Meeting—Alpha Omega, University of Georgia at Athens.

4. The general Chapter Letter sent out each fall is apparently not carefully read by chapter officers when transacting chapter business. This Chapter Letter was made available this year to all members by the Editor who had it reprinted in the current *BIOLOGIST*. It is unnecessary to go over the letter point by point but three points should be particularly emphasized:

a. A time allowance of *at least* three weeks (preferably one month) must be allowed between the sending in of membership records and the chapter initiation. If every chapter's request is an emergency the Executive Secretary is put in a position where it is impossible to render service.

b. Membership records are often inadequately filled out—particularly in regard to the basis upon which the initiate was elected. Scholarship averages for undergraduates *must* be filled in and the basis for figuring them must be indicated. Where this is impossible for a faculty member a statement from the president of the chapter must indicate on what basis he was elected.

Where a graduate student is elected and grade average is difficult to enter, the minimum requirement is a statement on the membership form by the president that the initiate fulfills the scholarship requirement; a further statement as to the basis of election is desirable. In brief, the records of the national office must have some definite evidence on each record that the initiate is worthy of membership.

c. The financial obligation for initiates must be met when the records are processed or taken care of as indicated in the Chapter Letter.

5. To provide for needed expansion, chapters and individual members could be of great aid to the society by being on the lookout for possible new chapters. This would not only help to further the interests of the society but would help to take the financial pressure off from currently active chapters.

6. Reports of the various chapters indicate a considerable variation in requirements for membership. To maintain activity both locally and nationally it is urged that each chapter steer a middle of the road course on qualifications; qualifications should be such that Phi Sigma does not become a terminal honor but actively stimulates biological work.

7. A number of chapters have limited their members to classical biology, whereas many others take in a much wider scope. Interpretation of "biological sciences" for membership may include a great number of fields in applied biology. Expansion of your chapter into new biological fields will stimulate not only the number of members but the active interest in chapter activities.

8. The question has come up in several instances of possible conflict with other honorary fraternities—particularly Tri Beta. It has been ascertained in the latter case that there is no conflict of interest and no incompatibility in the same school. The same probably applies to other fraternities if their purposes are carefully examined.

9. A most important point that apparently has come up repeatedly year after year is loss of chapter records. It is recommended that every chapter decide on a permanent repository for

their records, and that this be located on the campus. Your faculty member who is Council Representative should have knowledge as to where these records are permanently kept and who has access to them. It is also recommended that the national Executive Secretary be informed of the location of these records and that this information be made part of the chapter record in the national files.

10. Finally, the Executive Secretary is willing to undertake to replace any chapter records that may have been lost and that are duplicated in the national files. Such an undertaking will necessitate considerable patience on the part of all parties concerned.

Report of the Treasurer was called for by the Chancellor.

The Treasurer reported that the books of the society were examined by Finkel and Finkel, Certified Public Accountants. The report of the C.P.A. was presented to the Auditing Committee.

Chapters should make an effort to return the cards that are sent out from the Executive Secretary's office for ordering the number of copies of THE BIOLOGIST needed. Unless such an order is sent to the Treasurer, chapters will frequently miss their copies of THE BIOLOGIST.

Report of the *Auditing Committee* was called for by the Chancellor.

The C.P.A. report as of June 30, 1952 appeared to be in good condition and was accepted by the Committee.

Discussion of the financial status, present and future, of Phi Sigma followed. The following recommendations were presented for consideration:

1. No increase in initiation fee.

2. A scholarship award, preferably to an undergraduate student, be financed by the local chapters. This award to be an annual event.

3. Economy measures, particularly in printing costs, should be stressed. According to the C.P.A. report, each copy of THE BIOLOGIST is costing approximately 75 cents. It is felt that this cost as well as other printing costs can be satisfactorily reduced. It is recommended that each delegate consult a reputable printer in his locality and secure a bid on publishing THE BIOL-

OGIST as well as printing the membership forms and other supplies. These bids shall be turned over to the committee on THE BIOLOGIST for possible action.

4. Expansion of Phi Sigma, as a means of increasing the cash in the treasury is desirable, if standards are maintained sufficiently high. Inactive chapters should also be contacted for the purpose of reviving them.

Respectfully submitted,

Richard E. Bradley, Chairman

Chairman of the *Auditing Committee* moved acceptance of the report; seconded by Rho (Levin); passed convention by oral vote.

Report of the *Biologist Committee* was called for by the Chancellor.

The committee considered the chapter news reports which were published in Vol. 34 of THE BIOLOGIST covering the academic year 1951-1952. This volume consisted of two combined issues, fall and spring. These two issues afforded the opportunity for publication of 68 chapter communications. Actually only 21 chapters reported during the year, four of them twice.

Although THE BIOLOGIST exists as the major means of inter-chapter communication 13 chapters failed to publish anything of their activities last year. Such a failure deprived their initiates of the right to be known by all the other members of Phi Sigma. The question was therefore raised as to the need for an editor among the chapter officers.

The committee feels that every chapter ordinarily has at least one suitable paper presented by some qualified speaker during the course of each school year. If only one such paper from each chapter were submitted to the Editor of THE BIOLOGIST our journal would be assured of material for the regular appearance of quarterly issues.

Respectfully submitted,

Arthur H. Kreitzer, Chairman

Chairman of the *Biologist Committee* moved acceptance of the report; seconded by Alpha Epsilon (Olah); passed convention by oral vote.

Report of the *Resolutions Committee* was called for by the Chancellor.

The Chairman presented the following resolutions:

1. Whereas Dr. Harley J. van Cleave is graciously serving as honorary President and was barred by illness from joining in the General Meeting, be it therefore resolved that Phi Sigma at its General Meeting extend to him its best wishes for a speedy and complete recovery, and also extend to him sympathy on the recent passing of his daughter. (*Note*, Dr. van Cleave died on Jan. 2, 1953)

2. Whereas Dr. A. I. Ortenburger, retiring Chancellor, missed his first General Meeting since 1928 because of illness, be it resolved that Phi Sigma extend to him its best wishes for a speedy and complete recovery.

3. Whereas A.A.A.S. put forth significant and helpful effort in our behalf, be it resolved that Phi Sigma extend to A.A.A.S. and particularly to Dr. Raymond L. Taylor, Assistant Administrative Secretary, deep appreciation to them for aid in the arrangements for the 1952 General Meeting.

4. Whereas Dr. Stanley Cain presented on short notice the principal address at the banquet of the General Meeting, be it resolved that our deep appreciation be made known to him.

5. Whereas Dr. Henry van der Schalie has had to resign after serving some four years as Council member and Executive Secretary of Phi Sigma, be it resolved that Phi Sigma extend its deep appreciation for his yeoman services.

Respectfully Submitted,
Yvonne Naum, Chairman

Chairman of the *Resolutions Committee* moved acceptance of the report; seconded by Pi (Garth) and Alpha Omicron (Kreitzer); passed convention unanimously by oral vote.

Report of the *Constitutional Amendments Committee* was called for by the Chancellor. The Chair ruled that each amendment presented for consideration be discussed and voted upon individually by the convention. The Chairman of the Committee presented the following report:

The Committee Chairman stated that after much labor the Committee was in substantial agreement on all proposed amendments, and that these amendments were essentially of a clarifying nature.

1. Art. II Sec. 3 (e) (3), page 5. At end of sentence add "*and initiation fee paid to the Executive Secretary.*"

Adoption moved and seconded, unanimously carried by convention.

2. Art IV Sec. 2, page 9. Delete the word "*promise*" in line 4 and insert in lieu thereof the word "*interest.*"

Line 7. Change the word "*science*" to "*sciences.*"

Lines 8, 9, 10, & 11, page 10. Delete entire last sentence of Art. IV Sec. 2 to-wit, "*Students in professional courses must, in addition to their scholastic record, have been engaged in research to be considered eligible for active membership.*"

Adoption moved and seconded, unanimously carried by convention.

3. Art. V Sec. 5 (2), page 12, line 1. Add "*which shall be available to all officers and shall be kept in a permanent campus location made known to the Executive Secretary.*"

Adoption moved and seconded, unanimously carried by convention.

4. Art. VI Sec. 2, page 13. To carry out the will of the 1950 biennial convention as charged in a motion, unanimously carried relative to duties of the chapter Executive Committee (page 8 of Minutes of 1950 General Meeting), add the following sentence to Sec. 2, "*It shall also record the special duties of each officer.*"

Adoption moved and seconded, unanimously carried by convention.

5. Official initiation ceremony of *Phi Sigma Society Ritual*, section 7, page 16. After the words "In testimony thereof, I ask you to step forward and receive from . . ." delete "*your certificate of membership and key*" and insert "*your credentials of membership. (certificate must always be given; give key if purchased)*" This clarification to conform with By-Laws Sec. 1 (a).

Adoption moved and seconded, unanimously carried by convention.

Report respectfully submitted
Richard W. Costello, Chairman

Report of the *Nominating Committee* was called for by the Chancellor.

Since the offices of Chancellor and Executive Secretary were open for election, the incumbents of these two offices retired from the meeting room. The

Chair was then occupied by the Vice-Chancellor (Stewart) and the Editor (Keefe) became Secretary pro tem.

The Nominating Committee placed Dr. Karl F. Lagler in nomination for Chancellor and Dr. Fred S. Orcutt in nomination for Executive Secretary.

Pi (Garth) moved that the nominations be closed, seconded by Alpha Nu (Donohue). Motion carried.

Alpha Omicron (Kreitzer) moved that a unanimous ballot be cast, seconded by Alpha Epsilon (Olah).

Lagler and Orcutt were escorted to the meeting room and informed of their election, whereupon they resumed their official duties.

Chancellor called for any old business to be transacted.

Omega (Russell) raised the point of initiation fees which was tabled at the 1950 General Meeting (page 8).

Several comments were made from the floor concerning the pressure of initiation fees holding down numbers of initiates, and still others concerning the increased national costs coupled with reduced numbers of initiates.

Vice-Chancellor (Stewart) stated that there probably could be no question of increase or decrease of fees, but that the financial problems of the society could best be met by:

- a. Reactivation of inactive chapters.
- b. Increase the number of chapters through expansion.
- c. Increase the number of initiates in each chapter.

Rho (Levin) stressed that many chapters are restricting their initiates to classical biology whereas a number of chapters such as Rho interpret "Biological Sciences" broadly to cover a number of applied biological fields. Rho presented a list of fields from which it draws initiates and this was supplemented by several other delegates as follows:

Agronomy
Animal Husbandry
Animal Nutrition
Animal Pathology
Anatomy
Bacteriology
Biochemistry
Biometry
Biophysics
Botany
Dairy Science

Entomology
Food Technology
Forestry
Geology (Historical)
Horticulture
Home Ec. (Nutrition)
Medical Technology
Pharmacology
Pharmacy
Physiology
Plant Physiology
Plant Pathology
Pre-medical
Psychology (Biological)
Soil Science
Zoology

This list does not constitute an attempt on the part of the convention to prepare an authorized list, but is rather an illustration of the concept of "Biological Sciences" as authorized under "membership eligibility" in the constitution.

Chancellor urged delegates to stress in their chapters the use of full authority and breadth of the Constitution.

Kappa (Kann) emphasized that it is not necessary for a chapter to get faculty certification of research ability of candidates.

Editor (Keefe) commented that he was glad to see such enthusiasm in the delegates, and felt that these discussions would result in a vitalizing of the activity and in an increase in the size of chapters. He urged that a good balance be kept between graduates and undergraduates. He particularly wanted to emphasize that there is no attempt on the part of anyone to fill up the Treasury, but that Phi Sigma must remain solvent.

Rho (Van Gelder) emphasized that increased national costs must be borne in mind in individual chapters.

Alpha Omicron (Kreitzer) stressed the importance of making Phi Sigma known on the campus, particularly among the freshmen and sophomores. Alpha Omicron awards a book each year to the outstanding freshman, and publicizes the honorary nature of Phi Sigma.

Alpha Alpha (Costello) suggested a board of directors of rotating membership to give continuity and experience to each chapter. Chancellor stated

that such a mechanism could function locally as does the national Council. The experience of such a group could give mature guidance.

Alpha Omicron (Kreitzer) has life member alumni for a payment of \$10 each. This entitles the alumnus to receive THE BIOLOGIST and vote if he attends four meetings a year. Such members often add to the chapter treasury each year, and they are a good source of speakers either directly or through their contacts.

Chancellor assigned this latter problem to the Council for study and wished to add it as a fourth point to the three made by the Vice-Chancellor previously.

Chancellor then called upon all delegates to pledge that they and their chapters would put forth an effort to reactivate one inactive chapter each or bring about the formation of a new one at a nearby institution.

Vice-Chancellor was called upon to give the number of inactive chapters, to which he replied 17.

The following pledges were made:

Bergstrom (Upsilon)—U. of Cincinnati, and U. of Dayton.

Bradley (Alpha Omega)—Florida State Univ., Duke Univ. (Tau).

Davis (Alpha Psi)—William and Mary (Alpha Zeta).

Ekstedt (Beta)—Wayne Univ., Washington Univ. (Iota).

Carter (Epsilon)—Ill. Normal, Ohio State (Alpha), S. Dak. (Alpha Gamma).

Clare (Treasurer)—U.C. (Alpha Upsilon), San Diego State. Claremont, Univ. of Calif. (Mu).

Costello (Alpha Alpha)—Santa Barbara.

Donohue (Alpha Nu)—N. Mexico A. & M., Highlands Univ., U. Arizona.

Foreman (Psi)—Washington State (Alpha Theta).

Garth (Pi)—Florida State Univ.

Iben (Alpha Eta)—Univ. of Kentucky.

Keefe (Editor)—Detroit Univ., Appleton (Alpha Delta).

Kreitzer (Alpha Omicron)—U. of Ottawa, Ill. State Teachers College.

Kann (Kappa)—Univ. Nebraska (Xi).

Lagler (Chancellor)—Univ. Idaho, Detroit Univ., Mich. State (Theta).

Lentfer (Chi)—Oregon State (Still active but may need help).

Levin (Rho)—Southern Ill. Univ., Univ. Arizona.

Olah (Alpha Epsilon)—Duquesne Univ.

Orcutt (Exec. Sec.)—U. Neb. (Xi), U. Texas (Alpha Sigma), U. Virginia, Univ. Indiana.

Templeton (Alpha Rho)—Ark. A. & M., Ark. Tech., Hendrix, Sou. State.

Saul (Alpha Lambda)—U.S.A.C.

Stewart (Vice-Chancellor)—Univ. Mexico (Alpha Tau).

Sutton (Alpha Pi)—Colo. A. & M.

Van Gelder (Rho)—North Dakota (Omicron), Southern Ill. Univ.

Winter (Alpha Alpha)—Univ. Mexico (Alpha Tau).

Pi (Garth) suggested consideration of future meetings with A.I.B.S. Also brought up problem of change of time to September which creates new problems for delegates and host.

Bradley (Alpha Omega) said he would conduct survey on printing costs for Phi Sigma. Chancellor officially appointed him chairman of such a committee.

Editor (Keefe) called attention of the delegates to opportunities for honorary members of Phi Sigma. Each chapter should be on the lookout for such members.

Omega (Russell) brought up as a piece of old business the question of cash awards supplemented from the national Treasury.

Chairman of the *Auditing Committee* (Bradley-Alpha Omega) said that with declining memberships and difficulty with national finances no cash awards could be given nationally, but should be encouraged locally.

Pi (Garth) brought up question of old business regarding limiting the number of terms for the members of the Council. This question had been discussed by the *Constitutional Amendments Committee* but no action taken because there appeared ample opportunity for chapters to present names of individuals for the Council that they felt might be qualified.

Chancellor stated that all chapters have the opportunity of proposing men for any and all positions in the national organization.

Meeting was adjourned at 12:50 P.M.

APPENDIX A.

*Condensation of Chapter Reports**Activities*

1. Annual meeting devoted to demonstration of research methods collection of data.
2. Lectures by outstanding scientists from various phases of pure and applied biological sciences, coupled with banquet or reception.
3. News letters and/or scientific publications common in a number of chapters.
4. Awards and/or scholarships of \$25 or more for outstanding work done by students, common in several chapters.
5. Endowment established from will of deceased member to sponsor specific projects or memorial research fund.
6. Some chapters alternate members and non-members on program.
7. Study of ways to improve quality of programs and research.
8. Maintain rotating displays in entrance halls.
9. Teaching assistance in local high schools.
10. Scientific movies — many highly technical and instructive.
11. Panel discussions by members, sometimes include faculty.
12. Chapter takes charge of displays and activities on high school day.

Maintenance of Interest

1. Life members for \$10 fee holds interest and activity of alumni. Such alumni good source of speakers, ideas, and funds.
2. Picnics to include families and faculty—sometimes freshmen.
3. Social functions in which effort is made to acquaint younger members with older ones doing research as well as with faculty.
4. Coffee hour before weekly seminar.
5. Sponsor field trips.
6. "Covered dish" dinners replace more expensive banquets.
7. Fall picnic to welcome new graduate students and faculty.
8. Some meetings where members bring lunch—chapter serves coffee.
9. Food committee prepares hot lunch for \$.25—meeting held during lunch hour.

Publicity

1. Printed yearly program.
2. Printed posters often illustrated posted before each meeting.
3. Plaque honoring deceased members.
4. Coke machine concession yields income and publicity.

Chief Problems of Chapters

1. Lack of continuity from year to year gets chapters off to slow start each year. Much of this is due to lack of "know-how" by new officers. A new constitutional amendment was passed by the convention making it mandatory for each chapter Executive Committee to "record" the special duties of each officer. This should make it possible over the years to preserve ideas and "know-how" so that new officers may start right out with confidence and knowledge of how the chapter has best functioned in the past.
2. Loss or unavailability of chapter records has plagued chapters for years; the yearly recurrence of this factor is largely unnecessary. A new constitutional amendment provides that the Recording Secretary must "preserve all manuscripts and records" but "which shall be available to all officers and shall be kept in a permanent campus location made known to the Exec. Secretary."

BANQUET GUESTS

Present at the Banquet during the General Meetings were the Council:

Dr. Karl F. Lagler, Beta, Chancellor
Mr. Erwine Hall Stewart, Epsilon,
Vice-Chancellor
Dr. Fred S. Orcutt, Zeta, Executive
Secretary

Prof. Tema S. Clare, Mu, Treasurer
Dr. Anselm M. Keefe, Zeta, Editor
Dr. Stanley A. Cain, Speaker

Among the guests were:

Dr. Marston Bates, Sigma, 1925
Dr. Paul Dansereau, Univ. of Geneva
Dr. Robert R. Miller
Dr. J. Speed Rogers, Beta, 1917
Dr. Paul B. Sears, Alpha, 1916.

Chapter Delegates present:

Richard D. Ekstedt, Beta, Michigan
Wendell Carter, Epsilon, Denver

Ellen E. Kann, Kappa, Kansas
 R. R. Lechleitner, Lambda, Montana
 Dan B. Donovan, Jr., Nu, Washington
 & Jefferson
 Richard E. Garth, Pi, Emory
 Norman Levin, Rho, Illinois
 Prof. David Bergstrom, Upsilon, Miami
 University Faculty
 Jack W. Lentfer, Chi, Montana State
 Margaret Forman, Psi, Washington
 H. T. Russell, Jr., Omega, Oklahoma
 Richard W. Costello, Alpha Alpha,
 Southern California
 Stephen E. Olah, Alpha Epsilon, Pitts-
 burgh

June D. Iben, Alpha Eta, Oklahoma A.
 & M.
 Yvonne Naum, Alpha Kappa, Hunter
 William E. Saul, Alpha Lambda, Utah
 John C. Donohue, Alpha Nu, New Mex-
 ico
 Arthur H. Kreitzer, Alpha Omicron,
 Marquette
 D. A. Sutton, Alpha Pi, Colorado
 George Templeton, Alpha Rho, Arkan-
 sas
 W. Jackson Davis, Alpha Psi, Virginia
 Polytechnic Inst.
 Richard E. Bradley, Alpha Omega,
 Georgia.

Delegates to the 1952 Convention in St. Louis:

When you pledged your own and your
 Chapter's efforts to reactivate an old, or establish
 a new, Chapter in Phi Sigma, DID YOU
 MEAN IT? ? ?

If You Did, What Have You Done?

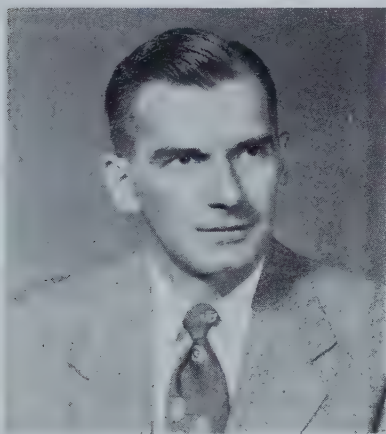
Others are doing things, why not you?

Or Don't You Assume that the
 Non-reproductive are Sterile?

AMONG OURSELVES

Personalities

State College, Pa., Feb. 6—Dr. Herbert R. Albrecht, professor and head of the department of agronomy and a national leader in forage crop research, has been named director of the Agricultural and Home Economics Extension Service at the Pennsylvania State College.



DR. HERBERT R. ALBRECHT

The appointment, announced today by Dr. Milton S. Eisenhower, president of the College, will become effective July 1. He will succeed J. M. Fry, who was eligible for retirement last June but who agreed to continue in the post for another year. His appointment had previously been approved by the College's trustees.

As director of the Agricultural and Home Economics Extension Service, Dr. Albrecht, who is 43, will head the agency through which information pertaining to agriculture, homemaking, and rural community life and welfare is distributed and made effective throughout Pennsylvania. The staff includes agricultural and home economics extension representatives in every

county of the State and specialists at the College. He's only the fourth man to head the service since 1907.

Educated at the University of Wisconsin, Dr. Albrecht's entire career has been identified with Land-Grant colleges and universities. At Wisconsin he earned his bachelor's, master's and doctor of philosophy degrees, majoring in plant genetics, a field in which he later was to gain international recognition.

In 1936, Dr. Albrecht was named assistant agronomist at Alabama Polytechnic Institute where he initiated a program in plant breeding work with forage crops. Five years later he was made associate agronomist. In 1944, he went to Purdue to set up research in forage and turf breeding and a year later was made assistant chairman of the department of agronomy. Most of his time at Purdue was devoted to plant breeding and the teaching of genetics.

In 1947, Dr. Albrecht was named professor and head of the department of agronomy at Penn State where he has developed a forage crop research program that has been rated as one of the foremost of its kind in the United States, perhaps in the world.

Active in the American Society of Agronomy, Dr. Albrecht was largely instrumental in bringing that organization to the Penn State campus two years ago for its first convention in the Northeast. At that time he was made a fellow of the Society and he now is serving as president of the Crop Science Division.

Outstanding work in forage crop research at Penn State helped to influence the selection of the campus as the site for the sixth International Grassland Congress last August. For this world-wide gathering of agronomists, Dr. Albrecht served as deputy secretary-general, was general chairman of local arrangements, and vice-chairman of the executive and program committees.

Dr. Albrecht is chairman of the Northeast Regional Forage Crops Technical Committee under the Research and Marketing Administration and during the last two years has closely cooperated with the extension service in the development of a grassland program for Pennsylvania. He is a member of the American Association for the Advancement of Science, the American Genetics Association, and the International Crop Improvement Association.

Fraternities of Dr. Albrecht's include Alpha Zeta, honorary professional in agriculture, of which he is national president; Society of the Sigma Xi, national scientific society; Gamma Sigma Delta, honorary agricultural fraternity; Zeta Chapter of and Phi Sigma, biological fraternity.

Dr. Albrecht is a native of Kenosha, Wis., and is married to the former Helen Terry, of St. Paul, Minn., who is a graduate of Milwaukee-Downer College. They have two daughters, Terry, in eighth grade, and Helen Virginia, in kindergarten.

Editor's Mail Bag

December 29, 1951

Dear Dr. Keefe:

Every member of Phi Sigma should be proud of their journal, "The Biologist." It is indeed a superb job of journalism.

Congratulations!

Sincerely,

William H. Stone,
Zeta Chapter,
Department of Genetics,
College of Agriculture,
The University of Wisconsin.

January 28, 1952

Dear Padre,

I have just received my first issue of "The Biologist" for the present year. It is up to its usual standards, I see. I was especially interested in the address by Dr. Birge and would like to see you publish more addresses which have been or are apt to become classics throughout the years.

Certainly wish I had received this copy, before Christmas since I would have been interested in attending the

biennial Convention. I had not known that it was to be held in St. Louis at the time of the AAAS meetings. I attended some of those meetings and would have been glad to see the Phi Sigma group again. If there is anything I can do to be of service to the national office, please feel free to call on me.

I wish that there was a chapter established here at Iowa State College since there are many people who would be interested in being members, I believe. There are plenty of meetings and other interests to take up our time here but I do not find that honor societies are very active at the graduate student level.

Will look forward to future issues of "The Biologist."

Very truly yours,

Samuel C. Wiggins,
Asst. Prof. of Agronomy,
Iowa State College of
Agriculture & Mechanic Arts,
Ames, Iowa.

March 28, 1952

Dear Keefe:

Many thanks for sending me the copy of the Sept.-Dec. issue of "The Biologist!" I realize how much I have been missing all these years, and am sending in a 5 year subscription under separate cover. I am unable to recall just how I happened to become detached from it in the first place. Also, I want to add my word of appreciation to those of your numerous correspondents. The thing that appeals to me is the tremendous amount of work represented in the issue on the part of the Editor,—so much different from most scientific journals. Who does the book reviews? That section alone must represent a pile of work.

The notice about Johansen's "Commission for Plant Slide Exchange," which I have seen also in other journals, is of course quite interesting to me; he seems to have developed quite a thing if it works out in practice.

With best wishes and more power to the Editor,

Sincerely,

George H. Conant
Triarch Botanical Products
Ripon, Wisconsin

April 1, 1952

Dear Padre:

As usual all I can say is that I am sorry not to have written sooner complimenting you on getting out the first issue of "The Biologist" for this school year. Your letter of March 12 to the Chapter editor and officers should produce results.

Sometime when I have a chance I will write you a letter with a little more news in it. Keep up the good work.

Sincerely yours,

A. I. Ortenburger
Retiring Chancellor,
Phi Sigma Society
Department of Zoology
University of Oklahoma
Norman, Oklahoma

July 15, 1952

Dear Dr. Keefe:

I did perpetrate the Manual of Mosses of Western Pennsylvania, but I'm truly innocent of having been an editor of "The Biologist."

Sincerely,

O. E. Jennings
Director Emeritus
Carnegie Museum
Pittsburgh 13, Pennsylvania

Dear Dr. Keefe:

It is desired, with your permission, and that of the author (which we have already received), to reprint in the *General Appendix to the Smithsonian Report for 1952* the article entitled "Snails and Their Relations to the Soil," which appeared in "The Biologist," vol. 34, Nos. 1-2, Sept.-Dec., 1951. Due credit will, of course, be given your publication as the original source.

Very truly, yours,

Paul H. Oehser
Chief, Editorial Division
Smithsonian Institution
Washington 25, D. C.

July 25, 1952

Dear Dr. Keefe:

May I congratulate you on the March-June 1952 issue of "The Biologist." Its contents are varied, stimulating, well-written, timely, and in-

formative—many happy returns for similar numbers!

Dr. Dexter's article, "Conservation—An Application of Ecology," appealed to me particularly since his thesis that "conservation has become a vital part of everyday living for every person" is one that I am trying to emphasize in my courses in invertebrate zoology, ecology, and general zoology. Somewhat of a mystery to me is the difficulty in getting mature undergraduates not only to understand the vital current importance of correct conservation investigation and practice, but also to appreciate the fact that federal and state conservation measures must be advised professionally and must always be free from politics as well as selfish, moneyed, industrial interests if we are to have "the greatest good for the greatest number." It seems to me that biology teachers on all levels of education have a unique opportunity to serve their country and their fellow men by (a) explaining matters conservational to their students, and (b) selling the importance of constantly keeping up with the wise use of our natural resources on local, state, and national levels.

What seems to me to be a beautiful demonstration of captious and sophistic argument in this connection is seen in Eugene Holman's article in the June "Atlantic Monthly" for this year, in which he has drawn up a partial inventory of our potential resources, and stressed the concept of limitless raw material remaining untapped in the world today, in an effort to refute the charge that we have dangerously depleted our resources. According to the data I have seen, this thesis is untenable; moreover, Holman's evidence and arguments apply more fittingly to the opposite side of his case. It seems clear, however, that this article typifies the conservation thinking of many industrialists because to believe otherwise would be to ruin their businesses, (which depend basically on raw materials), and nullify their advertising (based on the supposedly inexhaustible resources obtaining within the boundaries of the United States)! In summary, it is a false propaganda of the limitless plenty of raw materials—dogma which must be fought by every biology teach-

er and conservation organization worthy of the name.

With best regards,

Sincerely yours,

Donald J. Zinn

Assistant Professor of Zoology
University of Rhode Island
College of Arts and Sciences
Kingston, Rhode Island

July 29, 1952

Dear Dean Keefe:

Thank you for your letter of July 22. In reply to your first paragraph, the executors of the estate of Dr. Edward A. Birge included: Mr. Ray Stroud, Dr. E. A. Birge, Miss Anna Birge. It is my understanding that this estate has been closed.

I am glad to learn of your interest in the Baccalaureate Address, entitled "Science," which was presented by Dr. Birge as a part of the University's Commencement in 1925.

I have reread this address with much interest and agree with you that it is an excellent statement. I am happy to give permission to have this address reprinted in "The Biologist," and I am sure it will prove of great interest to the readers of this publication.

With kindest regards,

Yours sincerely,

E. B. Fred

Office of the President

The University of Wisconsin
Madison 6, Wisconsin

October 11, 1952

Dear Padre:

I sent you my Gosse manuscript on August 25, and since then the silence has been remarkable. Did you get it? Were you displeased with it? Has some awkward expression of mine offended you? My attempts at humor don't always come off as I hope for them to, and if I have blundered in some way, I hasten to offer my regrets. I wouldn't want our ancient friendship to be impaired in any way. Possibly you have been very busy, possibly ill. Anyway, I'd like to hear from you.

I'm just recovering from a case of flu, not serious, but it made me so

miserable for two weeks that I wanted to give up for keeps. The trouble is, one is always getting involved in some one's problems and feels obligated to hang around a while longer to help out. Maybe that is one way the good Lord uses to keep us on the job!

Sincerely,

David Causey

Department of Zoology

University of Arkansas

College of Arts and Sciences
Fayetteville, Arkansas

October 31, 1952

My dear Dr. Ortenburger:

It is with great pleasure that I bestow upon you a jeweled Phi Sigma key engraved with your name. This key is a token of the high esteem and appreciation held for you by all members past and present of the Society. The Council also sends with this token their very highest esteem. I hope that you will find great pride and pleasure in wearing this symbol of your devotion to a most worthy cause.

Your good wife who is a friend of all of us now on the Council is acting in our behalf in making the presentation to you. I am happy that it comes at a time when your health is improving and when you are practically your old self again. You have our collective best wishes for continued good health and a full return to your former vigor.

Very truly yours,

Karl F. Lagler

Department of Zoology

University of Michigan

Ann Arbor, Michigan

November 12, 1952

To the Members of the Council:

Thank you for your very complimentary letter of October 31, 1952. Please accept my sincere thanks for the beautiful jeweled key which you have had sent to me, and for the honor which I feel it implies. I shall of course wear it with great pride. May I assure you that your thoughtfulness is highly appreciated.

Sincerely yours,

A. I. Ortenburger

Retiring Chancellor,

Phi Sigma Society

Department of Zoology

University of Oklahoma

Norman, Oklahoma

January 26, 1953

Dear Anselm:

The enclosed may be suitable for "The Biologist" (or waste basket). Since I wrote you I have read Pope Pius XII paper on Science and God. Made me think of the good old Jesuits at St. Louis, Mo.—"as though God were

waiting behind every door opened by science." He is right, science and religion have not solved everything.

Good luck

Pearse

Department of Zoology

Duke University

Durham, North Carolina

PHI SIGMA AWARDS

1951 — 1952

School

UNIVERSITY OF MICHIGAN
UNIVERSITY OF DENVER
UNIVERSITY OF WISCONSIN
UNIVERSITY OF AKRON
MONTANA STATE UNIVERSITY
EMORY UNIVERSITY
UNIVERSITY OF ILLINOIS
UNIVERSITY OF FLORIDA
MIAMI UNIVERSITY
UNIVERSITY OF NEW HAMPSHIRE
UNIVERSITY OF WASHINGTON
UNIVERSITY OF OKLAHOMA
UNIVERSITY OF SO. CALIFORNIA
MONTANA STATE COLLEGE
MOUNT UNION COLLEGE
UNIVERSITY OF PITTSBURGH
OKLAHOMA A. & M.
BUCKNELL UNIVERSITY
HUNTER COLLEGE
OREGON STATE COLLEGE
UNIVERSITY OF NEW MEXICO
MARQUETTE UNIVERSITY
UNIVERSITY OF RHODE ISLAND
UNIVERSITY OF COLORADO
UNIVERSITY OF ARKANSAS
UNIVERSITY OF TEXAS
UNIV. CALIF. AT LOS ANGELES
UNIVERSITY OF THE PHILIPPINES
VA. POLYTECHNIC INSTITUTE
UNIVERSITY OF GEORGIA

Undergraduate

JOHN ADOLPH KADLEC
DAVID BRETERNITZ
THEODORE L. TETENBAUM
RICHARD A. PAMPLIN
JOHN J. GAFFNEY
WILLIAM JOSEPH RAWLS
ROBERT EDWARD HELLMAN
KENNETH C. SNYDER
DORIS H. CRANDALL
MARY HELEN HARFORD

JAMES BYRON SNOW, JR.
CHARLES ERNEST ELERDING
JACK WARREN LENTFER
RICHARD CHARLES MASTERS
ERNEST SPRAGUE
DAVID ALAN McGILL
GEDDA WITTMANN
WILLIAM McNEIL
VERNON C. GOLDIZEN
ARTHUR H. KREITZER
BARBARA JEAN CHAMPLIN
FAITH KIPP JONES
MARGARET L. MATTOON
WAYNE ALAN MYERS
BEVERLY D. MONDRICK
STANLEY FRANKLIN
ROBERT FRANK FORAN
REMEDIOS G. ONA
G. R. CRADDOCK
DOROTHY ANN LEINBACH

Graduate

HELEN ELAINE FISHER
BELLE KEENEY BERNATOWICZ
JAY WELLS
ANN MARIE TRAVIS
CHARLES J. WATERMAN
HAROLD CLYDE STEELE
WILLIAM L. STERN
CHARLES WILLIAM JAMES
CHARLES I. UYEDA
EDWARD CHIN
PAUL T. BRYANT
TOD MITTWER
JANE NISHIO
ROBERT B. YEE
ROBERT H. LEONARD
CLARK A. PORTER
RONALD R. CLOTHIER
ROBERT J. McGRAY
ALBERT ALCIDE BARBER
HAROLD J. GRANT, JR.
RUTH NAOMA STEUART
LINZEY LEON CAMPBELL, JR.
GEORGE HOLZ
JOVENTINO D. SORIANO
FRANK R. BURLESON
JAMES HOBART JENKINS

What Are YOU Doing

for

PHI SIGMA

?

or

Do You Expect It to Do

EVERYTHING

for You?

How High Has Your Social Consciousness

Developed?

CHAPTERS, OFFICERS AND ACTIVITIES

BETA

—University of Michigan

Ann Arbor Michigan

President—P. C. Rajam, Dep't. of Bacteriology, Univ. of Michigan.*Vice-Pres.*—Albert Grover, Dep't. of Bacteriology, Univ. of Michigan.*Treasurer*—Gerard VanHalsema, Dep't. of Bacteriology, Univ. of Michigan.*Council Rep.*—Dr. Karl F. Lagler, Dept. of Nat. Resources, Univ. of Michigan.

EPSILON

—University of Denver

Denver, Colorado

President—Wendell E. Carter, 4247 South Huron, Denver, Colorado.*Vice-Pres.*—Steven J. Cieciora, 1260 Pennsylvania, Apt. No. 8, Denver, Colorado.*Corr. Sec., Rec. Sec., & Treasurer*—Helen E. Kundert, 2148 South High, Apt. No. 229, Denver 10, Colorado.*Council Rep.*—Dr. Frederick Zeiner, 1417 So. Elizabeth, Denver, Colorado.

ZETA

—University of Wisconsin

Madison Wisconsin

President—Robert W. Van Keuren, Dept. of Agronomy, Univ. of Wisconsin.*Vice-Pres.*—Leslie M. Lueck, Dept. of Pharmacy, Univ. of Wisconsin.*Corr. Sec.*—Elizabeth Williams, Dept. of Horticulture, Univ. of Wisconsin.*Rec. Sec.*—Theodore W. Tibbitts, Dept. of Horticulture, Univ. of Wisconsin.*Treasurer*—Robert D. Tinline, Dept. of Plant Pathology, Univ. of Wisconsin.*Editor*—Ernest J. Bubieniec, Dept. of Botany, Univ. of Wisconsin.*Council Rep.*—O. N. Allen, Agr. Bacteriology, Univ. of Wisconsin.

ETA

—University of Akron

Akron, Ohio

President—Mrs. Mildred L. Park, Biology Dept., Univ. of Akron.*Vice-Pres., Sec.*—Irene L. Collins, Biology Dept., Univ. of Akron.*Treasurer*—Patricia Wolff, Biology Dept., Univ. of Akron.*Editor (Acting)*—Dr. Walter C. Kraatz, Univ. of Akron.

KAPPA

—University of Kansas

Lawrence, Kansas

President—Richard White, Dept. of Physiology, Univ. of Kansas.*Vice-Pres.*—Kieth Wolfenbarger, Dept. of Entomology, Univ. of Kansas.*Corr. Sec.*—Mary T. Taylor, Dept. of Bacteriology, Univ. of Kansas.*Rec. Sec.*—Eugene Wittlake, Dept. of Botany, Univ. of Kansas.*Treasurer*—Reed Roberts, Dept. of Entomology, Univ. of Kansas.*Editor*—Bernard Greenberg, Dept. of Entomology, Univ. of Kansas.*Council Rep.*—Mrs. Ruth K. McNair, Dept. of Biology, Univ. of Kansas.

At a recent meeting of the Executive Committee of Phi Sigma (Kappa) it was suggested we contact the National Office regarding the feasibility of including in one of the issues of "The Biologist" an article detailing the duties and responsibilities of the local chapter to the National Organization. Some of the items needing clarification are the following: allocation of dues, date dues are to be sent in; date chapter activities report should be forwarded; date of initiation of new members; calendar of Phi Sigma events for the coming year. We would appreciate your suggestions concerning the above.

Bernard Greenberg, Editor
(This appreciated suggestion was acted upon at once and Dr. Orcutt's advice to the Chapter Officers was reproduced in full in the last issue of "The Biologist."—Ed.)

LAMBDA

—Montana State University

Missoula, Montana

President—Richard Solberg, 613 S. Ave. W., Missoula, Montana (Botany)

Vice-Pres.—Richard Bjorklund, Corbin Hall, Missoula, Mont. (Wildlife Tech.)

Corr. Sec.—Lois Jean Baker, New Hall, Missoula, Mont. (Pre-Med.)

Rec. Sec. & Treasurer—Marjorie Holden, 601 Daly, Missoula, Mont. (Botany)

Council Rep.—Dr. L. G. Browman, Zoology Dept., M.S.U.

NU

—Washington and Jefferson College, Washington, Pennsylvania

President—William Inglis, 150 E. Maiden St., Washington, Penna.

Vice-Pres.—Robert Lynch, 150 E. Maiden St., Washington, Penna.

Sec.—Daniel V. Kimberg, Dormitory No. 2, Washington, Pa.

Treasurer—Melvin H. Sher, Dormitory No. 2, Washington, Penna.

Coun. Rep.—Dr. C. D. Dieter, Biology Dept., Washington and Jefferson College.

On November 11, 1952, the Nu Chapter of the Phi Sigma Society initiated 15 new members. Their names are as follows: Alvan Balent, Howard Bitterman, Robert Brodell, Daniel Donovan, Harry Gardner, Frank Hornicek, Edward Jaeger, G. Richard Jones, Theodore Lerner, James McCool, Lawrence Parmer, Jay Peterson, James Philips, Murray Sachs, Edgar Soifer.

Following the initiation ceremony, the chapter was addressed by Dr. Lyle Beck of the University of Pittsburgh. Dr. Beck discussed his work on the topic of "Sulfahydryl and Shock."

Since the time of the initiation, the Nu Chapter has been holding its bi-monthly sessions at which time we hear student reports and guest speakers.

Daniel V. Kimberg, Secretary

In November, 1952, twenty new members were added to the Sigma Chapter, Phi Sigma ranks at the University of Florida. These new members, representing about six colleges at the University, were entertained at the annual Phi Sigma Barbecue on December 7 in College Park on the University campus.

On December 17 the formal initiation ceremonies were held and Dr. P. H. Senn, Agronomy, welcomed the new members with an interesting talk headlining the background of Phi Sigma Society and briefly tracing its historical development, discussing its significance and importance and pointing out to the members their role in promoting the purpose and serious intent of the organization.

Following Dr. Senn's address, the meeting adjourned to the Florida Union Lounge for informal discussions and refreshments.

Sigma Chapter wishes to take this opportunity to extend its sincerest compliments to the Editor of "The Biologist" for the excellent issues of the past.

Nicholas Nader, Editor

PI

—Emory University
Georgia

Dr. W. B. Baker, Dept. Biology, Emory University, Georgia.

RHO

—University of Illinois
Urbana, Illinois

President—Robert W. Hull, Dept. of Zoology, 345 Natural History Bldg., Univ. of Ill.

Vice-Pres.—Donald C. Goodman, Dept. of Zoology, 345 Natural History Bldg., Univ. of Ill.

Sec.—George Garoian, Dept. of Zoology, 345 Natural History Bldg., Univ. of Ill.

Treasurer—Keen Rafferty, Jr., Dept. of Zoology, 345 Natural History Bldg., Univ. of Ill.

Editor—Richard G. Van Gelder, Dept. of Zoology, 345 Natural History Bldg., Univ. of Ill.

Council Rep.—Prof. Norman D. Levine, 219 Veterinary Research Center, Univ. of Ill.

Our first talk of the year was "Arctic Research" by Bert Babero, who is with the Arctic Health Research Center in Anchorage, Alaska. Despite the short notice given to our members, as Mr. Babero lectured during the first week of the semester, we had an ex-

cellent turnout and good newspaper coverage.

"How to Please an Editor" was the topic of our November talk by Dr. Harvey I. Fisher of the Zoology Department. Dr. Fisher has served on the editorial board of the Condor, the Auk, and Pacific Science, and he is well qualified to discuss this important aspect of research.

"Some Methods and Applications of the Electron Microscope" was presented on December 16, 1952, by Dr. A. E. Vatter of the Chemistry Department. The application of the use of the electron microscope is a most important aspect of much current research, and no well trained biologist should be without some familiarity with the problems and limitations of this new and useful tool.

"Cellular Differentiation and Growth Control" will be the subject for the final talk of this semester. Dr. S. M. Rose of the Zoology Department will discuss some of the more interesting portions of this fundamental aspect of biology. He will include in his talk some of the information on the amazing inhibitions of growth which he has recently produced, an aspect which may be extremely important in future cancer research.

Early next semester we will send out a list of our talks for the last half of the school year. We have some very interesting topics already lined up, and we are sure that you'll all want to be there for these meetings.

One of the problems which came up at our last Executive Council meeting concerned "The Biologist." Is it possible to have "Entered as Second Class Mail," etc., printed somewhere on the cover of "The Biologist?" Our postage bill has been mounting, as we have quite a few members who cannot be reached through University mail. If there is no legal complication involved, we would like very much to see this added to "The Biologist."

Richard G. Van Gelder, Editor
(This matter is being taken up with the postal authorities.—Ed.)

SIGMA

—University of Florida

Gainesville, Florida

President—Frederick B. Thompson, Jr.,
Box 2935, University Station

Vice-Pres.—Edmund Stueben, Biology Dept., Univ. of Fla.

Corr. Sec.—Marjorie A. Briggs, Biology Dept., Univ. of Fla.

Rec. Sec.—Carolyn Bicknell, 1112 N.W. 1st Place, Gainesville, Fla.

Treasurer—Bert Theuer, Biology Dept., Univ. of Fla.

Editor—Nicholas Nader, Box 2653 University Station.

Council Rep.—Dr. Pierce Brodtkorb, Biology Dept., Univ. of Florida.

UPSILON

—Miami University

Oxford, Ohio

President—Alan Sogg, 210 Elliot Hall, Oxford, Ohio.

Vice-Pres.—Donald Anderson, 133 Ogden Hall, Oxford, Ohio.

Sec.—Barbara Bowles, 145 North Hall, Oxford, Ohio.

Treasurer—Jo Ann Bowling, 218 North Hall, Oxford, Ohio.

Council Rep.—Dr. W. E. Wilson, Botany Dept., Miami University.

PHI

—University of New Hampshire

Durham, New Hampshire

President—James Hanks, Zoology Dept., Durham, N. H.

Vice-Pres.—Charlotte Merrill, Zoology Dept., Univ. N. H.

Corr. Sec.—Lois Lord, Congreve South, Durham, N. H.

Rec. Sec.—Gertrude Hughes, 55 Fourth St., Dover, N. H.

Treasurer—John Wise, Zoology Dept., Durham, N. H.

Council Rep.—Prof. C. F. Jackson, Nesmith Hall, Durham, New Hampshire.

CHI

—Montana State College

Bozeman, Montana

President—John Spindler, 51 Beech MSC, Bozeman, Montana.

Vice-Pres.—Janice Kampschror, 503 West Cleveland, Bozeman, Montana.

Corr. Sec.—Alice Opalka, Quad E MSC, Bozeman, Montana.

Rec. Sec.—Edith Johnston, 1119 South Fifth, Bozeman, Montana.

Treasurer—Loris Hamlin, Hudson House MSC, Bozeman, Montana.

Editor—Joan Huxley, Evergreen Apartments, Bozeman, Montana.

Council Rep.—John A. Callenbach, 1414 So. Grand, Bozeman, Montana.

PSI

—University of Washington
Seattle, Washington

President—George H. Allen, Room 220, Fisheries Center, Univ. of Washington.

Vice-Pres.—Duane G. Newcomb, Room 401-D, Johnson Hall, Univ. of Washington.

Corr. Sec.—Zina Kizuita, 1213 Shelby St., Seattle 2, Washington.

Rec. Sec.—Margaret Foreman, Dept. of Zoology, Univ. of Washington.

Treasurer—Albert C. Jones, Room 226, Fisheries Center, Univ. of Washington.

Council Rep.—Dr. M. H. Hatch, Dept. Zoology, Univ. of Washington.

Psi Chapter of Phi Sigma completed the year's activity on May 20, 1952, with an illustrated lecture on the "Australian Aborigines" presented by Dr. D. Sutherland Davidson Professor of Anthropology, followed by election of officers for the succeeding year.

Dr. Davidson expounded on the many strange facets of the culture of their society, their religion and, especially explaining the complete adaptation of these people to their environment. The lecture was supplemented by a number of artifacts which Dr. Davidson exhibited and demonstrated, while in addition a technicolor film produced by the Australian government entitled "Walkabout" was shown. The meeting adjourned to the customary 'coffee' session following the election of officers at which time Dr. Davidson graciously answered numerous additional questions that were of interest to many of the chapter members and guests.

During the course of the lecture a discussion of the practice and neces-

sity of infanticide among these Australian aborigines piqued the curiosity of both young and old alike. Although the question no doubt occurred to a majority of the older guests present, it was one of the younger generation who posed the point to a startled parent: "What do they kill them with daddy?" As one might imagine in such a case, no resulting answer. Under the continued scientific verbal questioning and physical nudging, the youngster finally obtained the following faltering reply: "Why they kill them with, with . . . with an eye to the future!"

Other speakers who presented talks during the 1951-52 season were Dr. Johan T. Ruud, Walker-Ames Lecturer at the School of Fisheries during the fall quarter, 1951, Head of the Department of Marine Biology at the University of Oslo and the Director of the Institute of Whale Research. Dr. Ruud spoke on "Problems of Pollution in the Oslo Fjord." Mr. Bernard Flageolle, Clinical Photographer at Swedish Hospital for the past seven years and well known for his achievements in designing and building his own photographic equipment, presented an illustrated talk concerning his work. The highlights of a recent three months trip to Japan made at the request of the United States Government were presented by Dr. Richard Van Cleve, Professor and Director of the School of Fisheries. The changes in the physical and biological conditions that followed a sudden flood in 1947 of Kautz Creek located on Mount Rainier were explained in an illustrated lecture by Dr. Philip Had-dock, Assistant Professor of Forestry. Dr. Paul Ralph, Assistant Professor of Anatomy, completed the program for the year in presenting an illustrated talk concerning his work with the phase microscope.

The chapter enjoyed a very successful season, both socially and financially, under the very capable presidency of Margaret E. Dunn and the faithful sponsorship of Dr. Melvin Hatch of the Zoology Department.

OMEGA

—University of Oklahoma
Norman, Oklahoma

President—Benjamin A. Stinson, Zoology Dept., Univ. of Okla.

Vice-Pres.—Jack Esslinger, Zoology Dept., Univ. of Okla.

Corr. Sec.—Joe Anderson, Plant Sciences, Univ. of Okla.

Rec. Sec.—Carol Tillotson, Zoology Dept., Univ. of Okla.

Treasurer—Shirley Handler, Zoology Dept., Univ. of Okla.

Editor—Horace A. Hays, Zoology Dept., Univ. of Okla.

Council Rep.—Dr. A. I. Ortenburger, Dept. of Zoology, Univ. of Okla.

The above-named persons will serve until March, 1953, at which time the annual election will be held.

Incidentally, Omega Chapter has recently acquired a new faculty sponsor, Dr. Paul R. David of the Department of Zoology.

We shall also meet in special session this coming week and select our delegate to the biennial convention to be held at St. Louis, Missouri.

If I can be of further service, please let me know because we of Omega Chapter hope to perpetuate any reputation we may have for dependability and devotion to the principles of the Phi Sigma Society.

Benjamin D. Stinson, President

ALPHA ALPHA

—Univ. of Southern California
Los Angeles, California

Council Rep.—Mrs. Tema Clare.

ALPHA BETA

—Mount Union College
Alliance, Ohio

President—Ronald Miller, R. D. No. 1, Louisville, Ohio.

Vice-Pres.—Phyllis Spitler, 119 Woodside St., North Canton, Ohio.

Corr. Sec. & Rec. Sec.—James Magisana, 2234 7th St., N.E., Canton, Ohio.

Treasurer—Donald Krabill, East Canton, Ohio.

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Alpha Kappa Chapter of Hunter College held its semi-annual initiation in the Shuster Room of Roosevelt House on December 7. Seven new

members were happily welcomed to our chapter.

At our initiation we were very fortunate to have as our guest speaker Dr. Joseph Jailer of Presbyterian Hospital, N. Y., who spoke on "Adrenal Virilism." It proved to be a most stimulating talk. Following Dr. Jailer's speech, refreshments were then served—and so another toast was proposed for the coming good wishes bestowed upon our newly-elected members.

In addition, Alpha Kappa Chapter is asking the aid of all other chapters of Phi Sigma to refer all students and scientifically interested individuals in New York City to our chapter for possible membership.

Ruth Bendet, Former Secretary

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Salt Lake City, Utah

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Editor—Raymond Lee, Department of Vert. Zool., Univ. of Utah, S. L. C., Utah.

The chapter members commenced their activities by inviting Mr. Max Smolik as main speaker at their first general meeting of the year. Mr. Smolik, a practicing trichologist in Salt Lake City, spoke on "Modern Procedures in the Treatment of Hereditary and Nonhereditary Scalp Disorders." The next meeting Mr. H. C. Godbe was guest speaker. Mr. Godbe is Executive Secretary of the Metropolitan Water District of Salt Lake City. After he finished his talk on "Is Salt Lake City's Water Supply Contaminated?", there was a stimulating discussion and those attending left with an increased insight into the practical side of Salt Lake City's water problem.

The chapter held its annual banquet

at the Temple Square Hotel. Preceding the meeting twelve new members were initiated into the chapter. New members were welcomed at the banquet by Mr. Nielsen and Gerold De Barry responded for the new initiates. Chapter members were fortunate in obtaining Mr. Eldredge as guest speaker. He presented an illustrated lecture on the "Customs of the Navajo Indian People."

At the chapter's last regular meeting, new officers were elected. Following the election of officers, Dr. John D. Spikes spoke on "The Biological Importance of Photosynthesis." The regular meetings were attended by many people other than members.

The new initiates are: Wi Pere Amaru, John Bushman, Gerold De Barry, Grant O. King, Ivan Geumlek, Edsel Jorgenson, Ray McClelland, Dwayne Ogzawalla, Brian Pendleton, Mrs. Vivian Swinyard, Dr. Robert Vickery, William Wardle.

Howard R. Bullock
Division of Biology, B304
Univ. of Utah

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The Alpha Xi Chapter of Phi Sigma held its first meeting of the fall semester on October 21, 1952, at 7:30 p.m. in Ranger Hall. Following the business meeting, the subject "Contacts of Science With the World Issue" was discussed by Dr. John Albright of the Physics Department and Professor Robert DeWolf of the Zoology Department. When the speakers had concluded, all those present were invited to participate in a discussion of the subject.

Two meetings were held to select new members. Invitations were sent out and nine students, including three graduate students, accepted the invitations. They will be initiated in February.

On December 15, the Phi Sigma Christmas party was held at Professor DeWolf's home. Several of our pledges attended the party. Games were played and humorous gifts were exchanged. Refreshments were served by Mrs. DeWolf and a good time was enjoyed by all present.

Each member of Alpha Xi Chapter is to present a paper or project at some future meeting. We are looking forward to these papers and they should be interesting. More informa-

tion about the nature of these projects will be available for the next issue of "The Biologist."

Beverly Whitman, Editor (Alpha Xi's annual, "The Cell," for 1952 was, as usual, an interesting and impressive publication. The Chapter is to be congratulated.—The Editor)

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Milwaukee, Wisconsin

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Dr. Donald F. Greiff, professor of biology at St. Louis (Mo.) university, will talk on viruses and virus-like organisms at 2 p.m. Sunday, March 15, at the Marquette university science building, 1217 W. Wisconsin Ave. His talk will be the annual public Phi Sigma lecture. Phi Sigma is the national biology honorary society. Dr. Greiff is an alumnus of Marquette and a charter member of the society. He received his doctorate from Johns Hopkins University, Baltimore, Md., in 1942. He is a specialist in physiology of cells. (from the "Milwaukee Journal," 8 March, 1953).

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(Alpha Chi Chapter is publishing a "Science Bulletin," but only one copy of it has so far reached "The Biologist" office. It is an excellent job, and should do much to establish this lively chapter in the good will and esteem of University authorities. Other copies would be much appreciated.—The Editor)

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Council Rep.—Dr. Elon E. Byrd, Dept. of Biology, University of Georgia.

New Books

(Continued from page 103)

- Lawrence, Kansas. 1952. 303 pp. Exchange only. Apply to Exchange Desk, University Library.
- MAMMALS OF UTAH, by STEPHEN D. DURRANT. University of Kansas, Lawrence, Kansas. 1952. 549 pp. Exchange only. Apply to the Exchange Desk, University Library.
- MY GREAT OAK TREE AND OTHER POEMS, by LIBERTY HUDE BAILEY. Chronica Botanica Co., Waltham, Mass. 1952. Free upon request to Publisher.
- RADIOACTIVE ATOMS AND ISOTOPIC TRACERS, by JOSEPH W. KENNEDY, Phi Lambda Upsilon, Department of Chemistry, State College, Pa. 1952. 89 pp. \$2.00.
- SAND CRAB EMERITA TALPOIDA, by R. E. SNODGRASS. Smithsonian Institution, Washington, D. C. 1952. 34 pp.
- SEE HOW THEY GROW, by M. FIELD, J. V. DURDEN & F. P. SMITH. Penguin Books, Inc., 3300 Clipper Mill Rd., Baltimore 11, Md. 1952. 85c.
- SO NOW COLLITCH, by HERBERT NACHMAN. The Dietz Press, Inc., 112 East Cary St., Richmond 19, Va. 1952. 112 pp.
- SYNOPSIS OF N.A. MICROTINE RODENTS, by E. R. HALL & E. LENDELL COCKRUM. University of Kansas, Lawrence, Kansas. 1953. 123 pp. Exchange only. Apply to the Exchange Desk, University Library.
- VIRUSES AS CAUSATIVE AGENTS IN CANCER, edited by R. W. MINER & C. P. RHODES. New York Academy of Science, 2 East 63rd St., New York 21, N. Y. 1952. 400 pp., illus. \$4.00.
- WORLD POPULATION PROBLEMS, edited by R. W. MINER & JAMES A. GOODE. New York Academy of Science, 2 East 63rd St., New York 21, N. Y. 1952. 139 pp.
- LAKE STATES FOREST EXPERIMENT STATION, University Farm, St. Paul 1, Minn. Reproduction on Cut-Over Swamplands in the Upper Peninsula of Michigan, by Z. A. Zassada. Station Paper, No. 27. 15 pp. December 1952.
- per Michigan Second-Growth Hardwoods.
- No. 387: Deer Damage to Jack Pine in Michigan.
- No. 388: Spacing Effects on Jack Pine after 25 Years.
- No. 389: Height Growth of Conifers in Northeastern Minnesota.
- No. 390: Volume in Tops and Limbs Sawlog Trees.
- UNIVERSITY OF KANSAS PUBLICATIONS, Museum of Natural History, Vol. 5, 1952. Exchange only. Apply to the Exchange Desk, University Library, Lawrence, Kansas.
- No. 15: Taxonomic Notes on Mexican Bats of the Genus *Rhogiesia*, by E. Raymond Hill. 4 pp.
- No. 16: Taxonomy and Distribution of N.A. Woodrats (Genus *Neotoma*), by Keith R. Kelson. 10 pp.
- No. 17: Subspecies of Mexican Red-bellied Squirrel, *Sciurus aureogaster*, by Keith R. Kelson. 8 pp.
- No. 18: Geographic Range of *Peromyscus melanophrys*, by Rollin H. Baker. 8 pp.
- No. 19: A New Chipmunk from the Black Hills, by John A. White. 4 pp.
- No. 20: New Pinon Mouse from Durango, Mexico, by Robert B. Finley, Jr., 5 pp.
- No. 21: Annotated Check List of Nebraskan Bats, by Olin L. Webb & J. Knox Jones, Jr. 11 pp.
- No. 22: Geographic Variation in Red-backed Mice of the Southern Rocky Mountain Region, by E. Lendell Cockrum & Kenneth L. Fitch. 12 pp.
- No. 23: Taxonomy and Distribution of N. A. Microtines, by E. Raymond Hall & E. Lendell Cockrum. 20 pp.
- No. 24: Subspecific Status of Two Central American Sloths, by E. Raymond Hall & Keith R. Kelson. 5 pp.
- No. 25: Taxonomy and Distribution of Some North American Marsupials, Insectivores, and Carnivores, by E. Raymond Hall & Keith R. Kelson. 23 pp.
- No. 26: Taxonomy and Distribution of Some N.A. Rodents, by E. Raymond Hall & Keith R. Kelson. 29 pp.

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Mile Posts

- 1915 March 17, Alpha Chapter organized, Ohio State University, Columbus.
- 1916 May, Central Governing Body organized, BIOLOGIST first issued.
- 1917 June, last War-time BIOLOGIST issued.
- 1921 February, BIOLOGIST revived.
- 1924 December, First National Meeting, Constitution revised, Washington, D. C.
- 1925 December, Second National Meeting, First Science Program, Kansas City.
- 1926 December, Third National Meeting, Second Science Program, Philadelphia.
- 1927 December, Third Science Program, Nashville.
- 1928 December, Fourth National Meeting, Coat-of-Arms adopted, Fourth Science Program, New York.
- 1930 January, Council Meeting, Ritual Revised, Norman, Okla.
December, Fifth National Meeting, Fifth Science Program, Cleveland.
- 1931 Phi Sigma Letters Registered, U. S. Patent Office.
- 1932 December, Sixth Science Program, Atlantic City.
- 1933 June, Sixth National Meeting, Seventh Science Program, Chicago.
- 1935 December, Seventh National Meeting, Eighth Science Program, St. Louis.
- 1937 December, Eighth National Meeting, Ninth Science Program, Indianapolis.
- 1939 December, Ninth National Meeting, Tenth Science Program, Silver Anniversary, Ohio State University, Columbus.
- 1941 December, Tenth National Meeting, Dallas, Texas.
- 1946 December, Eleventh National Meeting, Boston, Mass.
- 1948 December, Twelfth Meeting, Eleventh Science Program, Albuquerque, N. Mex.
- 1949 February, Joins the Association of College Honor Societies.
- 1950 December, Thirteenth Meeting, Denver and Boulder, Colorado.
- 1952 December, Fourteenth Meeting, St. Louis, Mo.